R-7A63(W)M
R-7A63(B)M
R-7E53(W)M
R-7E53(B)M

SHARP SERVICE MANUAL

S9105R7A63EKW

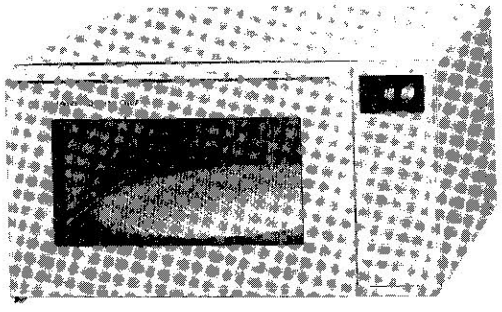

Photo R-7A63(W)M

GRILL AND CONVECTION MICROWAVE OVEN

MODELS R-7A63(W)M R-7A63(B)M R-7E53(W)M R-7E53(B)M

In interests of user-safety the oven should be restored to its original condition and only parts identical to those specified should be used.

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SHARP CORPORATION

R-7A63(W)M
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SERVICE MANUAL

SHARP

GRILL AND CONVECTION MICROWAVE OVEN

R-7A63(W)M/ R-7A63(B)M/ R-7E53(W)M/ R-7E53(B)M

GENERAL IMPORTANT INFORMATION

This Manual has been prepared to provide Sharp Corp. Service engineers with Operation and Service Information.

It is recommended that service engineers carefully study the entire text of this manual, so they will be qualified to render satisfactory customer service.

CAUTION
MICROWAVE RADIATION

Service engineers should not be exposed to the microwave energy which may radiate from the magnetron or other microwave generating devices if it is improperly used or connected. All input and output microwave connections, waveguides, flanges and gaskets must be secured. Never operate the device without a microwave energy absorbing load attached. Never look into an open waveguide or antenna while the device is energized.

WARNING

Never operate the oven until the following points are ensured.
(A) The door is tightly closed.
(B) The door latches and hinges are not defective.
(C) The door is not deformed or warped.
(D) There is not any other visible damage with the oven.

Servicing and repair work must be carried out only by trained service engineers.

All the parts marked "*" on parts list are used at voltages more than 250V.

SHARP CORPORATION

OSAKA, JAPAN

PRODUCT SPECIFICATIONS
APPEARANCE VIEW
OPERATING SEQUENCE
FUNCTION OF IMPORTANT COMPONENTS
TROUBLESHOOTING CHART
TEST PROCEDURE
TOUCH CONTROL PANEL
COMPONENT REPLACEMENT AND ADJUSTMENT PROCEDURE
MICROWAVE MEASUREMENT
TEST DATA AT A GLANCE
WIRING DIAGRAM
PICTORIAL DIAGRAM
PARTS LIST

PRODUCT DESCRIPTION

SPECIFICATION

ITEM	DESCRIPTION
Power Requirements	240 Volts 50 Hertz Single phase, 3 wire earthed
Power Consumption	Microwave cooking 1.50 kW Approx. 6.30 A Dual cooking (Roast/Bake) 2.80 kW Approx. 11.70 A Dual cooking (Grill) 2.50 kW Approx. 10.40 A Convection cooking 1.35 kW Approx. 6.10 A Grill cooking Max 2.35 kW Approx. 10.20 A
Power Output	730 watts nominal of RF microwave energy (2 liter water load) 850 watts nominal of RF microwave energy (measured by way of IEC705) Operating frequency of 2450MHz
Convection heater Power Output	1.3kW
Grill heater Power Output	1.0kW
Case Dimensions	Width 550 mm Depth 491 mm Height 312 mm including foot
Cooking Cavity Dimensions	Width 381 mm Depth 375 mm Height 205 mm
Turntable diameter	360mm
Control Complement	Touch Control System Microwave Cooking Control Repetition Rate; HIGH ..... Full power throughout the cooking time MED HIGH ..... approx. 70% of Full Power MED ..... approx. 50% of Full Power MED LOW (DEFROST) ..... approx. 30% of Full Power LOW ..... approx. 10% of Full Power
Set Weight	Approx. 24.0 kg

FUNCTION	R-7A63	R-7E53
AUTO DEFROST	O	X
AUTO COOK	O	X
JACKET POTATOES	O	X
FRESH VEGETABLES	O	X
FROZEN VEGETABLES	O	X
RICE/PASTA	O	X
FISH	O	X
DUAL COOK	O	O
GRILL	O	O
MICROWAVE	O	O
CONVECTION	O	O
kg .Lb	O	X
g .oz	O	X
Kg ← → Lb	O	X
LESS (▼)	O	X
MORE (▲)	O	X
DOUBLE QUANTITY	O	X
TIMER / HOLD	O	X
AUTO START / CLOCK	O	X
CLOCK	X	O
STOP / CLEAR	O	O
AUTO MINUTE / START	O	X
AUTO MINUTE	X	O
START	X	O
3 KEY (10 MIN., 1MIN., 10 SEC.)	O	O
KEY TOTAL	24	11

GENERAL INFORMATION

WARNING

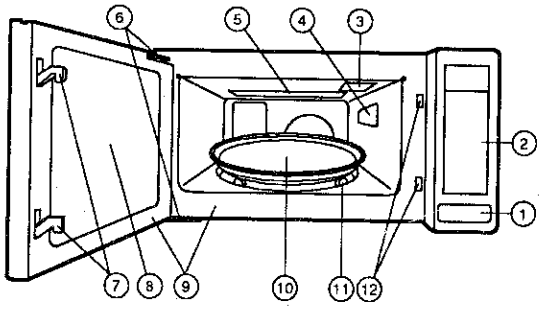
THIS APPLIANCE MUST BE EARTHED

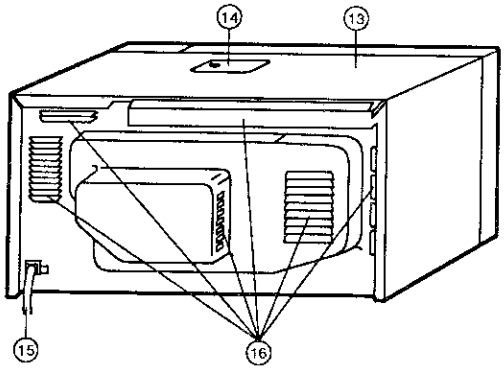
IMPORTANT

THE WIRES IN THIS MAINS LEAD ARE COLOURED IN ACCORDANCE WITH THE FOLLOWING CODE:

GREEN-AND-YELLOW	: EARTH
BLUE	: NEUTRAL
BROWN	: LIVE

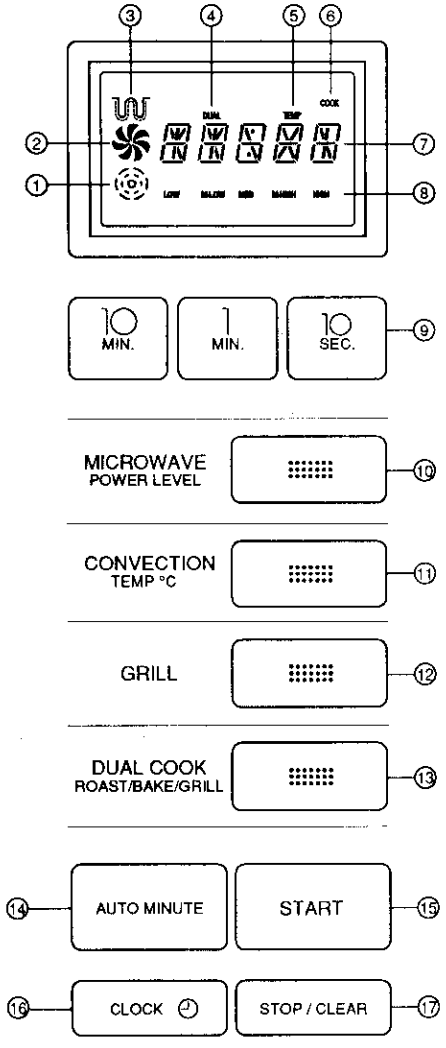
APPEARANCE VIEW





1. open door button
2. auto-touch control panel
3. oven light
4. waveguide cover
5. quartz grill
6. door hinges
7. safety door latches
8. oven door with see through window
9. door seals and seal surfaces
10. turntable
11. roller stay
12. holes for safety door latches
13. outer cabinet
14. removable cover oven light bulb
15. power supply cord
16. air vent openings

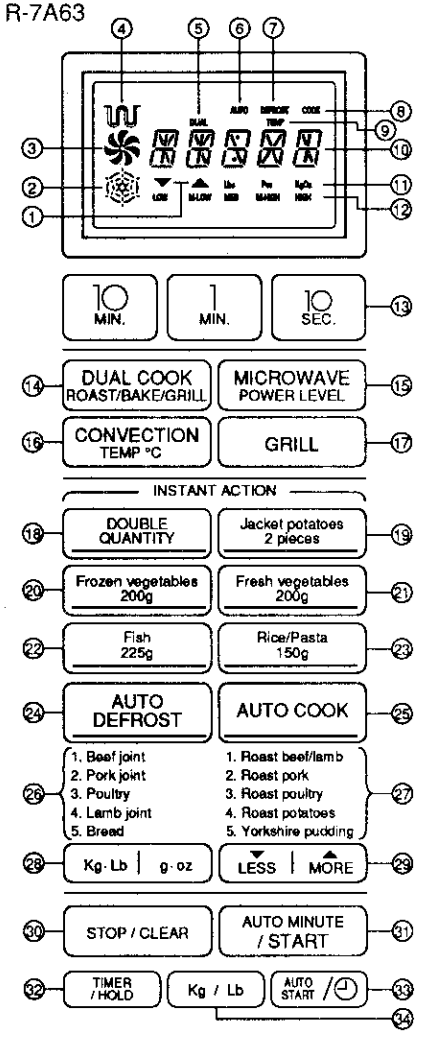
R-7E53



DISPLAY AND INDICATORS
① MICROWAVE symbol
② CONVECTION symbol
③ GRILL symbol
④ DUAL COOK indicator
⑤ Temperature indicator
⑥ Cook indicator
This indicator shows cooking in progress.
⑦ Digital display
⑧ Microwave power level indicator

OPERATING PADS
⑨ Time pads
Touch these pads to set the time for a cooking process.
Touch these pads to set the time of day.
⑩ MICROWAVE pad
Touch to choose MICROWAVE mode and to select microwave power level.
⑪ CONVECTION pad
Touch to choose CONVECTION mode and to select the oven temperature.
⑫ GRILL pad
Touch to choose GRILL mode.
⑬ DUAL COOK pad
Touch to choose DUAL COOK mode. (Roast, Bake or Grill mode)
⑭ AUTO MINUTE pad
Touch to cook for multiples of 1 minute on HIGH or increase by multiples of 1 minute during cooking.
⑮ START pad
Touch to start the programme.
⑯ CLOCK (🕘) pad
Touch to set clock.
⑰ STOP/CLEAR pad
Touch to cancel during programming.
Touch once to stop oven during cooking and twice to cancel the programme.

R-7A63



DISPLAY AND INDICATORS
① LESS/MORE indicator
② MICROWAVE and defrost symbol
③ CONVECTION symbol
④ GRILL symbol
⑤ DUAL COOK indicator
⑥ AUTO COOK indicator
⑦ AUTO DEFROST indicator
⑧ Cook indicator
This indicator shows cooking in progress.
⑨ Temperature indicator
⑩ Digital display
⑪ Units of weight or amount indicator
⑫ Microwave power level indicator

OPERATING PADS
⑬ Time pads
Touch these pads to set the time for a cooking process.
Touch these pads to set the time of day.
Touch these pads to set the Auto-Start time.
⑭ DUAL COOK pad
Touch to choose DUAL COOK mode. (Roast, Bake or Grill mode)
⑮ MICROWAVE pad
Touch to choose MICROWAVE mode and to select microwave power level.
⑯ CONVECTION pad
Touch to choose CONVECTION mode and to select the oven temperature.
⑰ GRILL pad
Touch to choose GRILL mode.
⑱ DOUBLE QUANTITY pad
Touch to cook a double quantity of INSTANT ACTION food before touching INSTANT ACTION pad.
⑲ ~ ㉑ INSTANT ACTION pads
Touch to cook INSTANT ACTION food listed on the key pad.
㉔ AUTO DEFROST pad
Touch to choose the foods from the menu list ㉖, then enter the weight.
㉕ AUTO COOK pad
Touch to choose the foods from the menu list ㉗, then enter the weight or amount.
㉖ AUTO DEFROST menu
㉗ AUTO COOK menu
㉘ Weight (Number) pad
Touch to enter the weight of food in lbs/oz or kg/g.
Touch [kg/Lb] pad to enter the number of foods.
㉙ LESS(▼)/MORE(▲) pads
Touch to allow you to cook or defrost food a little less or more than the preset automatic programmes.
㉚ STOP/CLEAR pad
Touch to cancel during programming.
Touch once to stop oven during cooking and twice to cancel the programme.
㉛ AUTO MINUTE/START pad
Touch to start the programme.
Touch to cook for multiples of 1 minute on HIGH or increase by multiples of 1 minute during cooking.
㉜ TIMER/HOLD pad
Touch to set minute timer and to programme standing time.
㉝ AUTO START/CLOCK (🕘) pad
Touch to set clock or AUTO START time.
㉞ CONVERSION pad
Touch to change the weight unit either from kg/g to lbs/oz or counter.

OPERATING SEQUENCE

OFF CONDITION

Closing the door activates all door interlock switches (1st latch switch, 2nd latch switch and stop switch.)

IMPORTANT

When the oven door is closed, the monitor switch contacts COM-NC must be open.

When the microwave oven is pluged in a wall outlet (240V 50Hz), 240 volts A.C. is supplied to the point A7 + A9 in the control unit.

Figure O-1 on page 41

1. The display flashes "88:88".
2. To set any programmes or set the clock, you must first touch the STOP/CLEAR key.
3. " : " appears in the display.

NOTE: When the oven door is opened, the oven lamp comes on at this time.

MICROWAVE COOKING CONDITION

HIGH COOKING

Enter a desired cooking time with the touching time key and start the oven with touching START key.

Function sequence Figure O-2 on page 41

CONNECTED COMPONENTS	RELAY
Oven lamp and turntable motor	RY1
Power transformer	RY2
Fan motor	RY6

1. 240 volts A.C. is supplied to the primary winding of the power transformer. The voltage is converted to about 3.3 volts A.C. output on the filament winding and high voltage of approximately 2000 volts A.C. on the secondary winding.
2. The filament winding voltage (3.3 volts) heats the magnetron filament and the high voltage (2000 volts) is sent to the voltagedoubling circuit, where it is doubled to negative voltage of approximately 4000 volts D.C..
3. The 2450 MHz microwave energy produced in the magnetron generates a wave length of 12.24 cm. This energy is channeled through the waveguide (transport channel) into the oven cavity, where the food is placed to be cooked.
4. When the cooking time is up, a signal tone is heard and the relays RY1 + RY2 + RY6 go back to their home position. The circuits to the oven lamp, power transformer, fan motor and turntable motor are cut off.
5. When the door is opened during a cook cycle, the switches come to the following condition.

SWITCH	CONTACT	CONDITION DURING COOKING	CONDITION DOOR OPEN (NO COOKING)
1st latch switch	COM-NO	Closed	Open
Monitor switch	COM-NC	Open	Closed
2nd latch switch	COM-NO	Closed	Open
Stop switch	COM-NO	Closed	Open

The circuits to the power transformer, fan motor and turntable motor are cut off when the 1st latch switch, 2nd latch switch and stop switch are made open. The oven lamp remains on even if the oven door is opened after the cooking cycle has been interrupted, because the relay RY1 stays closed. Shown in the display is the remaining time.

6. MONITOR SWITCH CIRCUIT

The monitor switch SW3 is mechanically controlled by oven door, and monitors the operation of the 1st latch switch SW1.

6-1 When the oven door is opened during or after the cycle of a cooking program, the 1st latch and 2nd latch switches SW1 + SW2 must open their contacts first. After that the contacts (COM-NC) of the monitor switch SW3 can be closed and then contacts of the stop latch switch SW4 can be opened.

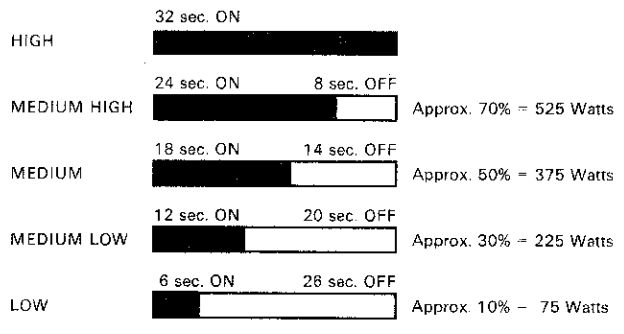
6-2. When the oven door is closed, the contacts (COM-NC) of the monitor switch SW3 must be opened first, and the contacts (COM-NO) of the stop switch SW4 must be closed. After that the contacts of the 1st latch switch SW1 and 2nd latch switch SW2 are closed.

6-3. When the oven door is opened and the contacts of the 1st latch switch SW1 remains closed, the fuse F2 M8A will blow, because the monitor switch is closed and a short circuit is caused.

HIGH, MEDIUM HIGH, MEDIUM, MEDIUM LOW, AND LOW COOKING

When the microwave oven is preset for variable cooking power, 240 volts A.C. power is supplied to the power transformer intermittently within a 32-second time base through the relay contact which is coupled with the current-limiting relay RY2.The following levels of microwave power are given.

SETTING



NOTE: The ON/OFF time ratio does not exactly correspond to the percentage of microwave power, because approx. 2 seconds are needed for heating up the magnetron filament.

AUTO DEFROST COOKING(R-7A63)

AUTO DEFROST automatically works out the correct microwave power and time for defrosting. What should be done is to chose menu and to enter the weight of food with the weight entry touch key. Once the oven starts, it will cook according to the special cooking sequence.

CONVECTION COOKING CONDITION

PREHEATING CONDITION (Figure O-3)

Program desired convection temperature by touching the CONVECTION key.
When the START key is touched, the following operations occur:

1. The coil of shut-off relays RY1, RY5 and RY6 are energized, the oven lamp, cooling fan motor, turntable motor and convection motor are turned on.
2. The coil of shut-off relay RY3 is energized by the control unit and the mains supply voltage is added to the convection heater.
3. When the oven temperature reaches the selected preheat temperature, the following operations occur:

3-1. The shut-off relay RY3 is de-energized by the control unit temperature circuit and thermistor, opening the circuit to the convection heater.

3-2. The oven will continue to function for 15 minutes, turning the convection heater on and off, as needed to maintain the selected preheat temperature.
The oven will shut-down completely after 15 minutes.

CONVECTION COOKING CONDITION (Figure O-3)

When the preheat temperature is reached, a beep signal will sound indicating that the holding temperature has been reached in the oven cavity. Open the door and place the food to be cooked in the oven. Program desired cooking time and convection temperature by touching the CONVECTION key. When the START key is touched, the following operation occur:

1. The numbers of the digital readout start the count down to zero.
2. The oven lamp, turntable motor, cooling fan motor and convection motor are energized.
3. Relay RY3 is energized (if the cavity temperature is lower than the selected temperature) and the mains supply voltage is applied to the convection heater to return to the selected cooking temperature.
4. Upon completion of the cooking time, the audible signal will sound, and oven lamp, turntable motor, cooling fan motor and convection motor, are de-energized. At the end of the convection cycle, if the cavity air temperature is above 100°C, the circuit to RY6 will be maintained (by the thermistor circuit) to continue operation of the cooling fan motor unit the temperature drops below 100°C, at that time the relay will be de-energized, turning off the fan motor.

GRILL COOKING CONDITION (Figure O-4)

In this condition the food is cooked by grill heater energy. And at the initial period (approximately 10 minutes) the convection heater is also activated.
Program desired cooking time and grill mode by touching TIME keys and GRILL key. When the START key is touched, the following operations occur:

1. The numbers of the digital readout start the count down to zero.
2. The oven lamp, turntable motor, cooling fan motor, and convection motor are energized.
3. The relay (RY4) is energized.
4. The relay (RY3) is energized, if the cavity temperature is lower than 200°C. When the cavity temperature reaches 200°C. RY5 and RY6 are de-energized.
5. Now, the food is grilled by the grill heater.

DUAL COOKING CONDITION

DUAL COOKING (ROAST/BAKE) (Figure O-5) (Microwave and Convection)

Program desired cooking time and DUAL COOK (ROAST/BAKE) mode by touching the TIME keys and DUAL COOK key. When the START key is touched, the following operations occur:

1. The numbers of the digital readout start the count down to zero.
2. The oven lamp, turntable motor, cooling fan motor, and convection motor are energized.
3. Relay RY3 is energized (if the cavity temperature is lower than the selected temperature) and the mains supply voltage is supplied to the convection heater.
4. The relay RY2 is energized and the microwave energy is generated by the magnetron.
5. Now, the food is cooked by the microwave and convection heater energy simultaneously.

DUAL COOKING (GRILL) (Figure O-6) (Microwave and Grill)

Program desired cooking time and DUAL COOK (GRILL) mode by touching the TIME keys and DUAL COOK key. three times.
When the START key is touched, the following operations occur:

1. The numbers of the digital readout start the count down to zero.
2. The oven lamp, turntable motor and fan motor are energized.
3. Relay RY4 is energized and the mains supply voltage is supplied to the grill heater.
4. The relay RY2 is energized and the microwave energy is generated by the magnetron.
5. Now, the food is cooked by the microwave and grill heater energy simultaneously.

AUTO COOK PROGRAMME

Keep on touching the AUTO COOK key until the desired cooking programme appears in the display. Then using the WEIGHT ENTRY key, enter the weight and touch the START key. The cooking modes and cooking time are automatically computed and selected based on the programmes.

INSTANT ACTION

INSTANT ACTION automatically works correct microwave power and cooking time. What should be done is to key in the type of food.

FUNCTION OF IMPORTANT COMPONENTS

DOOR OPEN MECHANISM

The door can be opened by pushing the open button on the control panel. When the open button is pushed, the open lever pushes lower latch head on the door upward. The upper latch head is linked with the lower latch head, so now, the door can be opened.

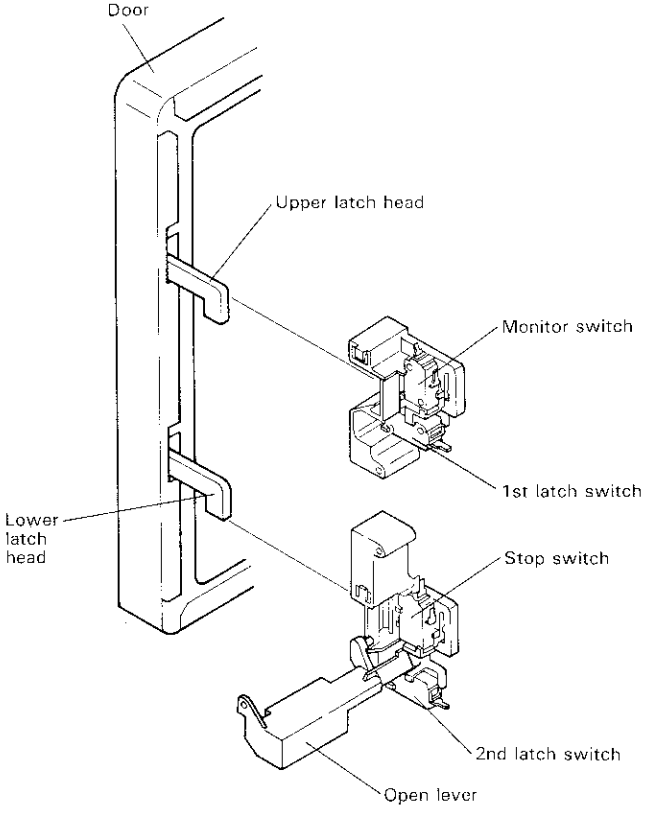


Figure D-1. Door Open Mechanism

1ST LATCH SWITCH SW1, 2ND LATCH SWITCH SW2 AND STOP SWITCH SW4

1. When the oven door is closed, the contacts COM-NO must be closed.
2. When the oven door is opened, the contacts COM-NO must be opened.

MONITOR SWITCH SW3

The monitor switch is activated (the contacts opened) by the upper latch head on the door while the door is closed. The switch is intended to render the oven inoperative by means of blowing the fuse(M8A) F2 when the contacts of the 1st latch switch SW1 fail to open when the door is opened.

Function

1. When the door is opened, the monitor switch SW3 contacts close (to the ON condition) due to their being normally closed. At this time the 1st latch switch SW1 is in the OFF condition (contacts open) due to their being normally open contact switches.
2. As the door goes to a closed position, the monitor switch contacts are opened and stop switch contacts are closed and then the 1st latch switch, and 2nd latch switch contacts close. (On opening the door, each of these switches operate inversely.)
3. If the door is opened and the 1st latch switch contacts fail to open, the fuse F2 (M8A) blows simultaneously with closing of the monitor switch contacts.

CAUTION: BEFORE REPLACING A BLOWN FUSE F2 M8A TEST THE 1ST LATCH SWITCH, MONITOR SWITCH AND MONITOR RESISTOR FOR PROPER OPERATION. (REFER TO CHAPTER "TEST PROCEDURE").

MONITOR RESISTOR R1

The monitor resistor prevents the fuse F2 M8A 250V bursting when the fuse F2 M8A 250V blows due to the operation of the monitor switch.

NOISE FILTER

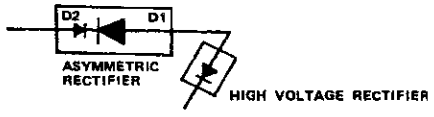
The noise filter assembly prevents radio frequency interference that might flow back in the power circuit.

FUSE F1 13A 250V

If the wire harness or electrical components are shortcircuited, this fuse F1 13A 250V blows to prevent an electric shock or fire hazard.

ASYMMETRIC RECTIFIER

The asymmetric rectifier is solid state device that prevents current flow is both directions. And it prevents the temperature rise of the power transformer by blowing the fuse F2 M8A when the high voltage rectifier is shorted.



The rated peak reverse voltage of D1 of the asymmetric rectifier is 6 KV The rated peak reverse voltage of D2 of the asymmetric rectifier is 1.7 KV. D1 and D2 of the asymmetric rectifier or high voltage rectifier are shorted when the each peak reverse voltage goes beyond the each rated peak reverse voltage. (The process of the blowing the fuse F2 M8A.)

1. The high voltage rectifier is shorted by any causes when microwave cooking or dual cooking.
2. The peak reverse voltage of D2 of the rectifier goes beyond the rated peak reverse voltage 1.7 KV in the voltage doubler circuit.
3. D2 of the rectifier is shorted.
4. The large electric currents flow through the high voltage winding of the power transformer.
5. The large electric currents beyond 8A flow through the primary widing of the power transformer.
6. The fuse F2 M8A blows by the large electric currents.
7. The power supplying to the power transformer is cut off.

FUSE F2 M8A 250V

1. If the wire harness or electrical components are short-circuited, this fuse blows to prevent an electric shock or fire hazard.
2. The fuse also blows when 1st latch switch SW1 remains closed with the oven door open and when the monitor switch SW3 closes.

THERMISTOR

The thermistor is a negative temperature coefficient type. The temperature in the oven cavity is detected through the resistance of the thermistor, and then the control unit causes the heater relay to operate, thus the current to the heater is turned ON/OFF.

TURNTABLE MOTOR

The turntable motor drives the roller stay to rotate the turntable.

CONVECTION MOTOR

The convection motor drives the convection fan and provides the heated air.

FAN MOTOR

The fan motor drives a blade which draws external cool air. This cool air is directed through the air vanes surrounding the magnetron and cools the magnetron. This air is channeled through the oven cavity to remove steam and vapors given off from the heating foods. It is then exhausted through the exhausing air vents at the oven cavity.

GRILL HEATER

The grill heater is provided to brown the food and is located on the top of the oven cavity.

CONVECTION HEATER

The convection heater is located at the rear of the oven cavity. It is intended to heat air driven by the convection fan. The heated air is kept in the oven and force-circulated and reheated by the convection heater.

TEMPERATURE FUSE TF 150°C

This fuse protects the magnetron against overheat. If the temperature goes up higher than 150°C because the fan motor is interrupted, the inhaler duct is blocked or the ventilation openings are obstructed, the fuse blows and puts the oven out of operation. The defective fuse must be replaced with a new rated one.

THERMAL CUT-OUT 95°C TC1

The thermal cut-out protect the fan motor against overheat. If its temperature goes up higher than 95°C because the fan motor is locked or the ventilation openings are blocked, the contacts of the thermal cut-out TC1 will open and the line voltage to the control init will be cut off and the operation of the oven will be stoped.
When the oven cools itself down to 75°C, the contacts of the thermal cut-out will close again.

THERMAL CUT-OUT TC3 160°C (CONV.)

The thermal cut out protects the convection motor CM against overheat. If the temperature of the convection motor CM rises above 160°C because the convection fan is interrupted, the ventilation openings are obstructed or the other abnormal matter occurs, the thermal cut-out opens and switches off the oven. The defective thermal cut-out must be replaced with new rated one.

THERMAL CUT-OUT TC2 160°C(GRILL)

The thermal cut out protects the oven against overheat during grill cooking, convection cooking or dual (combination) cooking. If the temperature rises above 160°C because the fan motor is interrupted, the air inlet duct is blocked or the ventilation openings are obstructed, the thermal cut-out opens and switches off the oven.
The defective thermal cut-out must be replaced with new rated one.

CONVECTION COOKING SYSTEM

This oven is designed with a hot air heating system where food is not directly heated up by the convection heater, but is instead heated by forced circulation of the hot air produced by the convection heater.

The air heated by the convection heater is circulated through the convection passage provided on the outer casing of the oven cavity by means of the convection fan which is driven by the convection motor. It then enters the inside of the oven through the vent holes provided on the back side of the oven. Next,the hot air heats the food on the turntable and leaves the oven cavity through the vent in the oven cavity rear wall.

Without leaving the oven, this hot air is reheated by the convection heater, passes through the convection passage and enters the inside of the oven cavity again, in a continuing cycle.

In this way, the hot air circulates inside the oven cavity to raise its temperature and, at the same time, comes into contact with the food being cooked.

When the temperature inside the oven cavity reaches the selected temperature, the convection heater is de-energized. When the temperature inside the oven cavity drops below the selected temperature, the convection heat is energized again. In this way, the inside of the oven cavity is maintained at approximately the selected temperature.

When the convection time reaches "0", the convection heater is deenergized and the convection fan stops operating and the oven shuts off.

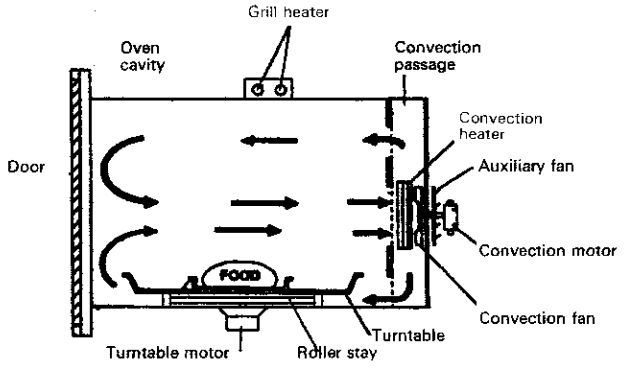
At the high temperature(more then 100°C), the fan motor remains rotating. Automatically the fan motor will be shut down at low temperature(less than 100°C).

SENSING FIRE OPERATION

The oven will stop its operation when there is a fire in the oven cavity in microwave cooking condition.

★ LSI measures the voltage across the temperature measurement circuit intermittently within a 32-second time base after 4 minutes since the oven is started in microwave cooking condition.
The oven will stop its operation when the difference of the voltages is more than 0.3 volts in microwave cooking condition.

1. Within a 32-second base, first the thermistor is energized for 3 seconds. After 2 seconds since the thermistor is energized, the voltage across the temperature measurement circuit is measured. And after 21 seconds since the thermistor is cut off, the convection motor operates for 6 seconds.
2. The oven carries out the procedure above again. If the second voltage is 0.3V higher than the first voltage, LSI judges it is a fire in the oven cavity and stops the oven.
3. When sensor cooking, the sensing fire operation is not carried out until the oven senses the steam from food. Because food cannot be cooked well by rotating the convection fan at that time. After sensing the steam, the sensing fire operation is started.
4. When LSI judges it is fire in the oven cavity, LSI will switch off the relays to the power transformer, fan motor and convection motor and LSI stops counting down. And then the damper is closed so that the fresh air does not come into the oven cavity.



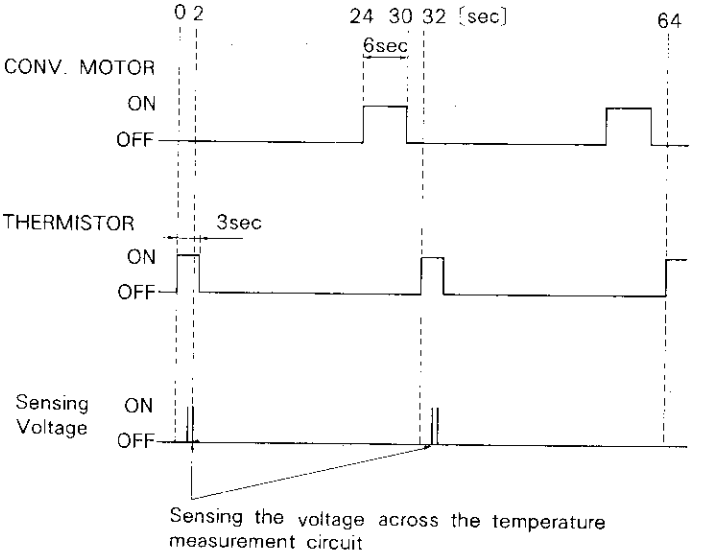


Figure D-2. Convection Cooking System

SERVICING

WARNING TO SERVICE PERSONNEL

Microwave ovens contain circuitry capable of producing very high voltage and current, contact with following parts:
High voltage capacitor, Power transformer, Magnetron, High voltage rectifier assembly, High voltage harness.

REMEMBER TO CHECK 3D

1) Disconnect the supply.
2) Door opened, and wedged open.
3) Discharge high voltage capacitor.

WARNING AGAINST THE CHARGE OF THE HIGH-VOLTAGE CAPACITOR

The high-voltage capacitor remains charged about 60 seconds after the oven has been switched off. Wait for 60 seconds and then short-circuit the connection of the high-voltage capacitor (that is, of the connecting lead of the high-voltage rectifier) against the chassis with the use of an insulated screwdriver.

Sharp recommend that wherever possible fault-finding is carried out with the supply disconnected. It may in, some cases, be necessary to connect the supply after the outer case has been removed, in this event carry out 3D checks and then disconnect the leads to the primary of the power transformer. Ensure that these leads remain isolated from other components and the oven chassis. (Use insulation tape if necessary.) When the testing is completed carry out 3D checks and reconnect the leads to the primary of the power transformer.

REMEMBER TO CHECK 4R

1) Reconnect all leads removed from components during testing.
2) Replace the outer case (cabinet).
3) Reconnect the supply.
4) Run the oven. Check all functions.

Microwave ovens should not be run empty. To test for the presence of microwave energy within a cavity, place a cup of cold water on the oven turntable, close the door and set the microwave timer for two (2) minutes. Set the power level to HIGH and push the START key. When the two minutes has elapsed carefully check that the water is now hot. If the water remains cold carry out 3D checks and re-examine the connections to the component being tested.

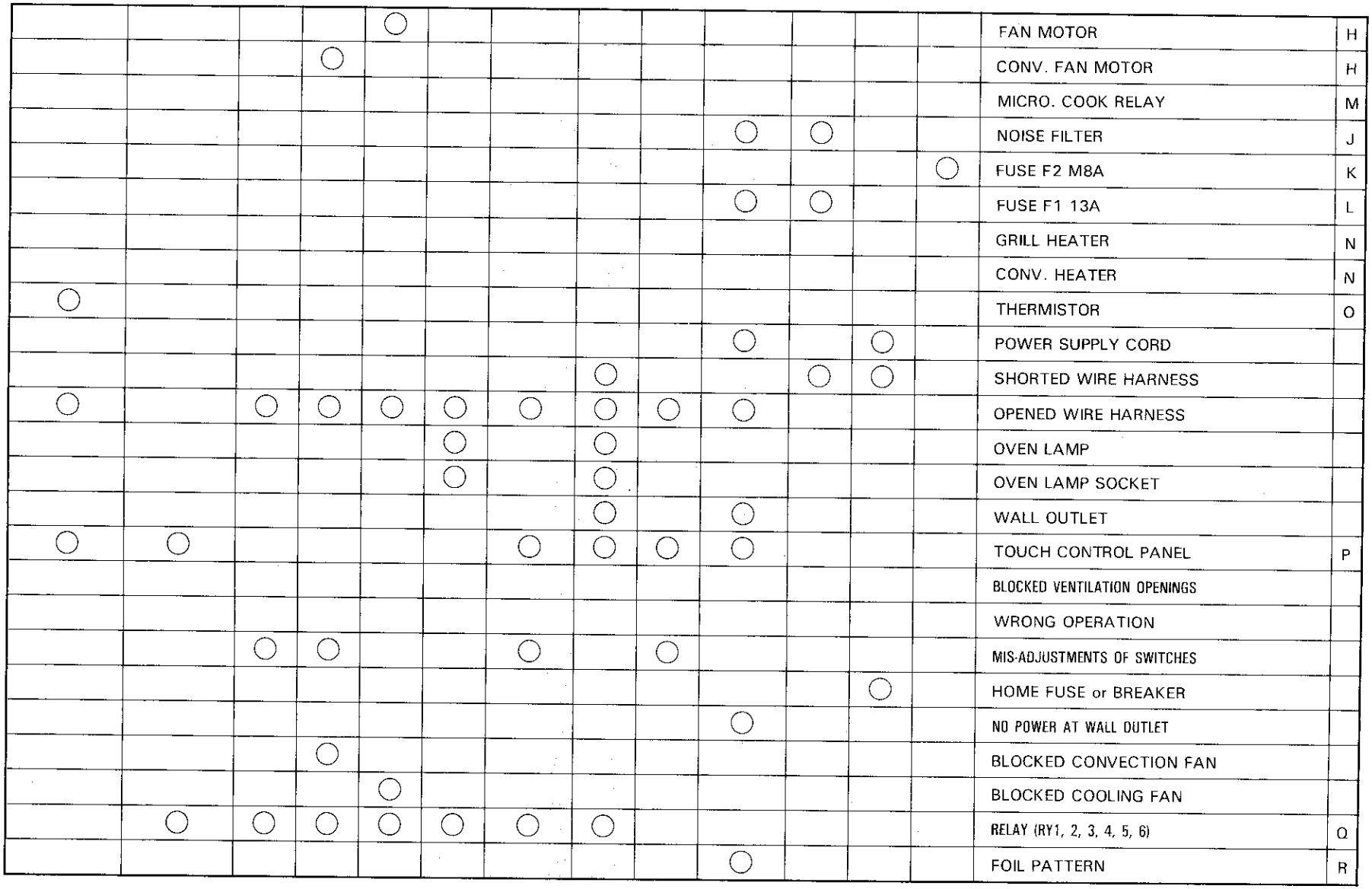
When all service work is completed, and the oven is fully assembled, the microwave power output should be checked and a microwave leakage test carried out.

TROUBLESHOOTING GUIDE

When troubleshooting the microwave oven, it is helpfull to follow the Sequence of Operation in performing the checks. Many of the possible causes of trouble will require that a specific test be performed. These tests are given a procedure letter which will be found in the "Test Procedure"section.

IMPORTANT: If the oven becomes inoperative because of a blown fuse F2 (M8A) in the 1st latch switch - monitor switch - monitor resisitor circuit, check the 1std latch switch, monitor switch and monitor resistor before replacing the fuse F2(M8A).

CONDITION	TEST PROCEDURE / POSSIBLE CAUSE AND DEFECTIVE PART / PROBLEM	A MAGNETRON	B POWER TRANSFORMER	C HIGH VOLTAGE RECTIFIER ASSEMBLY: H.V. RECTIFIER	C HIGH VOLTAGE RECTIFIER ASSEMBLY: ASYMMETRIC RECTIFIER	H.V. HARNESS	D HIGH VOLTAGE CAPACITOR	E 1ST LATCH SWITCH	E 2ND LATCH SWITCH	E STOP SWITCH	E MONITOR SWITCH	F MONITOR RESISTOR	G TEMP. FUSE 150°C TF	G THERMAL CUT-OUT 95°C TC1	G GRILL THERMAL CUT-OUT 160°C TC2	G CONV. THERMAL CUT-OUT 160°C TC3	H TURNTABLE MOTOR
OFF CONDITION	When the door is opened, Fuse F2 M8A blows.							○									
	Home fuse blows when power supply cord is plugged into wall outlet.																
	Fuse F1 13A blows when power supply cord is plugged into wall outlet.																
	88:88 does not appear in display but power supply cord is plugged into wall outlet.												○	○	○	○	
	Display does not operate properly when STOP/CLEAR key is touched.									○							
	Oven lamp does not light at door opened.									○							
ON CONDITION (COMMON MODE)	Oven does not start when the START key is touched. (Display appears.)									○							
	Oven lamp does not light. (Turntable motor operates.)																
	Fan motor does not operate. (Oven lamp lights.)																
	Convection fan motor does not operate. (Oven lamp lights.)								○								
	Turntable motor does not operate. (Oven lamp lights.)								○								○
	Oven or any electrical parts does not stop but cooking time is 0 or STOP/CLEAR key is touched. (Except fan motor)																
	Oven stops after about 4 minutes since START key is touched. (Except for Microwave mode and Dual Cook Grill mode)																



FAN MOTOR	H
CONV. FAN MOTOR	H
MICRO. COOK RELAY	M
NOISE FILTER	J
FUSE F2 M8A	K
FUSE F1 13A	L
GRILL HEATER	N
CONV. HEATER	N
THERMISTOR	O
POWER SUPPLY CORD	
SHORTED WIRE HARNESS	
OPENED WIRE HARNESS	
OVEN LAMP	
OVEN LAMP SOCKET	
WALL OUTLET	
TOUCH CONTROL PANEL	P
BLOCKED VENTILATION OPENINGS	
WRONG OPERATION	
MIS-ADJUSTMENTS OF SWITCHES	
HOME FUSE or BREAKER	
NO POWER AT WALL OUTLET	
BLOCKED CONVECTION FAN	
BLOCKED COOLING FAN	
RELAY (RY1, 2, 3, 4, 5, 6)	Q
FOIL PATTERN	R

CONDITION	PROBLEM \ TEST PROCEDURE / POSSIBLE CAUSE AND DEFECTIVE PART	A MAGNETRON	B POWER TRANSFORMER	C H.V. RECTIFIER	C ASYMMETRIC RECTIFIER	C HIGH VOLTAGE RECTIFIER ASSEMBLY	H.V. HARNESS	D HIGH VOLTAGE CAPACITOR	E 1ST LATCH SWITCH	E 2ND LATCH SWITCH	E STOP SWITCH	E MONITOR SWITCH	F MONITOR RESISTOR	G TEMP. FUSE 150°C TF	G THERMAL CUT-OUT 95°C TC1	G GRILL THERMAL CUT-OUT 160°C TC2	CONV. THERMAL CUT-OUT 160°C TC3	H TURNTABLE MOTOR
ON CONDITION (COMMON MODE)	Display operates properly but all electrical parts do not operate.																	
	Oven goes into cook cycle but shuts down before end of cooking cycle.													○	○	○	○	
	After cooking, the temperature of oven cavity is higher than 100°C but the fan motor does not operate.																	
MICROWAVE COOKING CONDITION	Oven seems to be operating but little or no heat is produced in oven load. (Microwave power level is set at HIGH.)	○	○	○	○		○	○	○									
	Oven does not seem to be operating properly when MEDIUM HIGH, MEDIUM, MEDIUM LOW or LOW is set. (Oven operates properly at HIGH.)																	
	Oven goes into cook cycle but shuts down before end of cooking cycle.													○		○		
CONVECTION COOKING CONDITION	Convection heater does not operate.									○								
	Oven seems to be operating but temperature in the oven cavity is lower or higher than preset one.																	
GRILL COOKING CONDITION	Grill heater does not operate.									○								
	Though the temperature of the oven cavity is higher than 200°C convection heater does not stop to heat. Or though the temperature of oven cavity is lower than 200°C convection heater stop to heat.																	
DUAL COOKING (ROAST/BAKE/GRILL) CONDITION	Oven goes into cooking cycle but shuts down before end of cooking cycle.													○				
	Oven seems to be operating but little or no heat is produced in oven load. (Microwave power does not seem to be generated properly.)	○	○	○	○		○	○	○									
DUAL COOKING (ROAST/BAKE) CONDITION	Oven seems to be operating but the temperature of the oven cavity is lower or higher than preset one.																	
	Convection heater does not operate.									○								
DUAL COOKING (GRILL) CONDITION	Grill heater does not operate.									○								

														○		FAN MOTOR	H
		○						○						○		CONV. FAN MOTOR	H
			○							○	○	○				MICRO. COOK RELAY	M
																NOISE FILTER	J
			○									○				FUSE F2 M8A	K
																FUSE F1 13A	L
										○						FOOD CATCHES FIRE	
○						○										GRILL HEATER	N
	○	○						○	○							CONV. HEATER	N
	○	○		○	○			○	○				○			THERMISTOR	O
																POWER SUPPLY CORD	
	○		○						○			○				SHORTED WIRE HARNESS	
○		○	○	○		○			○			○			○	OPENED WIRE HARNESS	
																OVEN LAMP	
																OVEN LAMP SOCKET	
																WALL OUTLET	
○	○	○		○	○	○	○	○		○	○	○				TOUCH CONTROL PANEL	P
				○					○					○		BLOCKED VENTILATION OPENINGS	
																WRONG OPERATION	
○	○		○			○		○			○					MIS-ADJUSTMENTS OF SWITCHES	
				○												HOME FUSE or BREAKER	
																NO POWER AT WALL OUTLET	
		○					○							○		BLOCKED CONVECTION FAN	
				○					○					○		BLOCKED COOLING FAN	
○	○	○		○	○	○	○	○	○	○						RELAY (RY1, 2, 3, 4, 5, 6, 7, 8, 9)	Q
																FOIL PATTERN	R

TEST PROCEDURES

PROCEDURE LETTER	COMPONENT TEST
A	MAGNETRON TEST

NEVER TOUCH ANY PART IN THE CIRCUIT WITH YOUR HAND OR AN INSULATED TOOL WHILE THE OVEN IS IN OPERATION.

CARRY OUT 3D CHECKS

Isolate the magnetron from the high voltage circuit by removing all leads connected to the filamen terminal.

To test for an open circuit filament use an ohmmeter to make a continuity test between the magnetron filament terminals, the meter should show a reading of less than 1 ohm.

To test for a short circuit filament to anode condition, connect ohmmeter between one of the filament terminals and the case of the magnetron (ground). This test should be indicated an inifinite resistance. If a low or zero resistance reading is obtained then the magnetron should be replaced

MICROWAVE OUTPUT POWER BY WAY OF IEC 705

The following test procedure should be carried out with the microwave oven in a fully assemblec condition (outer case fitted).
Microwave output power from the magnetron can be measured by way of IEC 705, i.e. it can be measured by using water load how much it can be absorbed by the water load. To measure the microwave output power in the microwave oven, the relation of calorie and watt is used.
When P(W) heating works for t(second), approximately P x t/4.187 calorie is generated. On the other hand, if the temperature of the water with V(ml) rises $\triangle T$ (°C) during this microwave heating period, the calorie of the water is V x $\triangle T$.

The formular is as follows;

$$P \times t / 4.187 = V \times \triangle T$$
$$P\ (W) = 4.187 \times V \times \triangle T / t$$

Our condition for the water load is as follows:
Room temperature ... around 20°C, Power supply Voltage ... 240 volts.
Water load ... 1000 mℓ, Initial temperature ... 10±2°C, Heating time .... 49sec.
$P = 85 \times \triangle T$

Measuring condition:

1. Container
   The water container must be a cylindrical borosilicate glass vessel having a maximum materia thickness of 3 mm and an outside diameter of approximately 190 mm.
2. Temperature of the oven and vessel
   The oven and the empty vessel are at ambient temperature prior to the start of the test.
3. Temperature of the water
   The initial temperature of the water is (10 ± 2)°C.
4. Select the initial and final water temperature so that the maximum difference between the final water temperature and the ambient temperature is 5K.
5. Select stirring devices and measuring instruments in order to minimize addition or removal of heat.
6. The graduation of the thermometer must be scaled by 0.1°C at minimum and an accurate thermometer.
7. The water load must be (1000 ± 5) g.
8. "t" is measured while the microwave generator is operating at full power. Magnetron filament heat-up time is not included.

NOTE: The operation time of the microwave oven is "t + 2" sec. 2 sec. is magnetron filament heat-up time.

Measuring method:

1. Measure the initial temperature of the water before the water is added to the vessel.

   Example: The initial temperature T1 = 11°C

2. Add the 1 litre water to the vessel.
3. Place the load on the centre of the shelf.

TEST PROCEDURES (CONT'D)

PROCEDURE LETTER	COMPONENT TEST

4. Operate the microwave oven at HIGH for the temperature of the water rises by a value △ T of (10 ± 2) K.
5. Stir the water to equalize temperature throughout the vessel.
6. Measure the final water temperature.

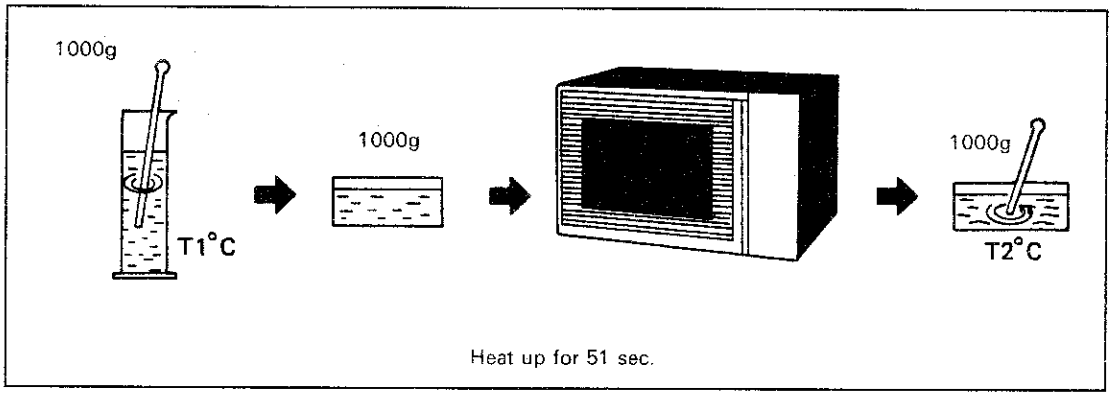
Example: The final temperature T2 = 21°C

7. Calculate the microwave power output P in watts from above formula.

Initial temperature	T1 = 11°C
Temperature after (49 + 2) = 51 sec.	T2 = 21°C
Temperature difference Cold-Warm	△T = 10°C
Mean temperature rise △T	
Measured output power The equation is as follows: P= 85 x △T	P= 85 x 10°C = 850 Watts

JUDGEMENT: The measured output power should be at least ±15 % of the rated output power.

CAUTION: 1°C CORRESPONDS TO 85 WATTS. REPEAT MEASUREMENT IF THE POWER IS INSUFFICIENT.



NOTE
THE IEC 705 PROCEDURE WHICH HAS BEEN WRITTEN IN THE SERVICE MANUAL IS A LABORATORY METHOD WHICH REQUIRES THAT THE OVEN HAS NOT BEEN USED FOR SOME HOURS PRIOR TO TESTING.
IT IS THERE UNSUITABLE FOR USE FOLLOWING A REPAIR. IT IS RECOMMENDED THAT THE METHOD GIVEN BELOW IS USED FOR NORMAL SERVICING PERFORMANCE CHECKING.

MICROWAVE POWER OUTPUT OF TWO LITTRE LOAD METHOD

The following test procedure should be carried out with the microwave oven in a fully assembled condition (outer case fitted).
Microwave output power from the magnetron can be measured by way of substitution, i.e. it can be measured by using water load how much it can be absorbed by the water load. To measure the microwave output power in the microwave oven, the relation of calorie and watt is used.
When P(W) heating works for t(second), approximately P x t/4.2 calorie is generated. On the other hand, if the temperature of the water with V(mℓ) rises △T (°C) during this microwave heating period, the calorie of the water is V x △T.

TEST PROCEDURES (CONT'D)

PROCEDURE LETTER	COMPONENT TEST

The formular is as follows;

$P \times t / 4.2 = V \times \triangle T$
$P\ (W) = 4.2 \times V \times \triangle T / t$

Our condition for the water load is as follows:
Room temperature ... around 20°C, Power supply Voltage ... 240 volts.
Water load ... 2000 ml, Initial temperature ... 10±1°C, Heating time ...1 min. 55 sec.
$P = 73 \times \triangle T$

Measuring method:

A) The two water containers must be prepared.
The water container must be one (1) litre beaker made of Pyrex glass and its diameter ap proximately 12cm.

B) Put the one (1) litre water into each beaker (Each beaker has one litre water). The initia temperature of the water should be 10±1°C.

C) Mark T1 on the one beaker and mark T2 on the other one. And stir the water and measure th temperature of water the thermometer and note them. The graduation of the thermometer mus be scaled by 0.1°C at minimum and an accurate mercury thermometer is recommended.

Example: The initial temperature T1 = 10°C, T2 = 11°C

D) Place the two (2) beakers at right and left, side by side, on the center of the oven cavity.

E) Set the timer to three (3) minutes and start the oven at HIGH.

F) The time must be measured with stopwatch or wristwatch.

G) After 1 minute and 55 seconds, stop the oven by opening the door.

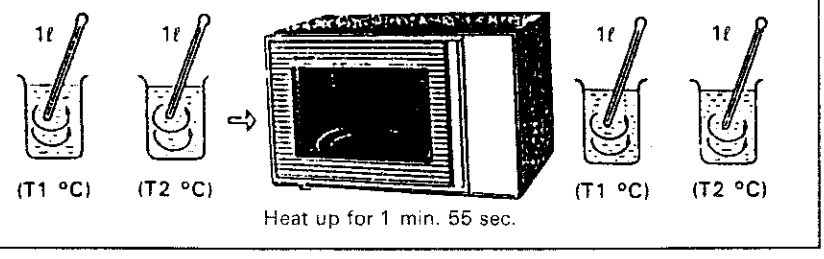
H) Put the two (2) beakers out of the oven cavity and measure the temperature of the water b stirring the water with thermometer and note them.

Example: T1 = 20°C, T2 = 21°C

Initial temperature	T1 = 10°C T2 = 11°C
Temperature after 1 min. 55 sec.	T1 = 20°C T2 = 21°C
Temperature difference Cold-Warm	△T1 = 10°C △T2 = 10°C
Mean temperature rise △T	△T = (△T1 + △T2) / 2 = (10°C + 10°C) / 2 = 10°C
Measured output power The equation is as follows: P= 73 x △T	P= 73 x 10°C = 730 Watts

NOTE: The measured output power should be at least ±15 % of the rate output power.

CAUTION: 1°C CORRESPONDS TO 73 WATTS.
REPEAT MEASUREMENT IF THE POWER IS INSUFFICIENT.



TEST PROCEDURES (CONT'D)

PROCEDURE LETTER	COMPONENT TEST

B POWER TRANSFORMER TEST

WARNING: High voltages and large currents are present at the secondary winding and filament winding of the power transformer. It is very dangerous to work near this part when the oven is on. NEVER make any voltage measurements at the high-vltage circuits, including the magnetron filament.

CARRY OUT 3D CHECKS.

Disconnect the leads to the primary winding of the power transformer. Disconnect the filament and secondary winding connections from the rest of the HV circuitry. Using an ohmmeter, set on a low range, it is possible to check the continuity of all three windings. The following readings should be obtained :-

a. Primary winding ----------1.536 ohms approximately.
b. Secondary winding -------85.2 ohms approximately.
c. Filament winding ---------less than 1 ohm.

If the reading obtained are not as stated above, then the power transformer is probably faulty and should be replaced.

CARRY OUT 4R CHECKS

C HIGH VOLTAGE RECTIFIER ASSEMBLY TEST

HIGH VOLTAGE RECTIFIER TEST

CARRY OUT 3D CHECKS.

Isolate the high voltage rectifier assembly from the HV circuit. The high voltage rectifier can be tested using an ohmmeter set to its highest range. Connect the ohmmeter across the terminal B+C of the high voltage rectifier and note the reading obtained. Reverse the meter leads and note this second reading. The normal resistance is intinte in one direction and mor than 100 kΩ in the other direction.

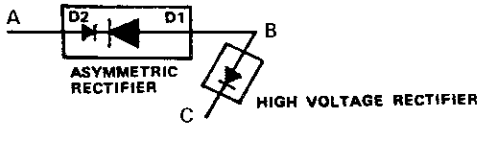
CARRY OUT 4R CHECKS

ASYMMETRIC RECTIFIER TEST

CARRY OUT 3D CHECKS.

Isolate the high voltage rectifier assembly from the HV circuit. The asymmetric rectifier can be tested using an ohmmeter set to its highest range. Connect the ohmmeter across the terminals A+B of the asymmetric rectifier and note the reading obtained. Reverse the meter leads and note this second reading. If an open circuit is indicated in both directions then the asymmetric rectifier is good. If a asymmetric rectifier is shorted in either direction, then the the asymmetric rectifier is probably faultly and must be replaced with the high voltage rectifier. When the asymmetric rectifier is defective, check whether magnetron, high voltage rectifier, high voltage wire or filament winding of the power transformer is shorted.

CARRY OUT 4R CHECKS



TEST PROCEDURES (CONT'D)

PROCEDURE LETTER	COMPONENT TEST

NOTE: FOR MEASUREMENT OF THE RESISTANCE OF THE RECTIFIRE, THE BATTERIES OF THE MEASURING INSTRUMENT MUST HAVE A VOLYAGE AT LEAST 6 VOLTS, BECAUSE OTHERWISE AN INFINITE RESISTANCE MIGHT BE SHOWN IN BOTH DIRECTIONS.

D HIGH VOLTAGE CAPACITOR TEST

CARRY OUT 3D CHECKS.

A. Isolate the high voltage capacitor from the circuit.
B. Continuity check must be carried out with measuring instrument which is set to the highest resistance range.
C. A normal capacitor shows continuity for a short time (kick) and then a resistance of about 10 MΩ after it has been charged.
D. A short-circuited capacitor shows continuity all the time.
E. An open capacitor constantly shows a resistance about 10 MΩ because of its internal 10 MΩ resistance.
F. Whe the internal wire is opened in the high voltage capacitor, the capacitor shows an infinite resistance
G. The resistance across all the terminals and the chassis must be in finite when the capacitor is normal.

If incorrect readings are obtained, the high voltage capacitor must be replaced.

CARRY OUT 4R CHECKS

E SWITCH TEST

CARRY OUT 3D CHECKS.

Isolate the switch to be tested and using an ohmmeter check between the terminals as described in the following table.

Table: Terminal Connection of Switch

Plunger Operation	COM to NO	COM to NC
Released	O.C.	S.C.
Depressed	S.C.	O.C.

COM; Common terminal, NO; Normally open terminal, NC; Normally closed terminal
S.C.; Short circuit, O.C.; Open circuit

If incorrect readings are obtained, make the necessary switch adjustment or replace the switch.

CARRY OUT 4R CHECKS.

F MONITOR RESISTOR TEST

CARRY OUT 3D CHECKS.

Disconnect the leads from the monitor resistor.
Using an ohmmeter and set on a low range.
Check between the terminals of the monitor resistor as described in the following table.

Table: Resistance

Resistor	Resistance
Monitor resistor	Approx. 0.8Ω

If incorrect readings are obtained, replace the monitor resistor.
CARRY OUT 4R CHECKS.

TEST PROCEDURES (CONT'D)

PROCEDURE LETTER	COMPONENT TEST

G TEMPERATURE FUSE OR THERMAL CUT-OUT TEST

CARRY OUT 3D CHECKS

Disconnect the leads from the terminals of the temp. fuse or thermal cut-out. Then using an ohmmeter, make a continuity test across the each two terminals as described in the table below.

CARRY OUT 4R CHECKS

Table: Temperature Fuse or Thermal Cut-out Test

Parts Name	Temperature of "ON" condition (closed circuit). (°C)	Temperature of "OFF" condition (open circuit). (°C)	Indication of ohmmeter (When room temperature is approx. 20°C.)
Temp. fuse 150°C TF	This is not resetable type.	Above 150°C	Closed circuit
Thermal cut-out 95°C TC1	Below 75°C	Above 95°C	Closed circuit.
Grill thermal cut-out 160°C TC2	Below −20°C	Above 160°C	Closed circuit.
CONV. thermal cut-out 160°C TC3	Below −20°C	Above 160°C	Closed circuit.

If incorrect readings are obtained, replace the temp. fuse or thermal cut-out.

An open circuit temperature fuse (TF) indicates that the magnetron has overheated, this may be due to resistricted ventilation, cooling fan failure.

An open circuit Grill thermal cut-out 160°C(TC2) indicates that the oven cavity has overheated, this may be due to no load operation.

An open circuit thermal cut-out 95°C(TC1) indicates that the fan motor winding has overheated, this may be due to resisted ventilation or locked cooling fan.

An open circuit CONV. thermal cut-out (TC3) indicates that the convection fan motor winding has overheated, this may be due to resisted ventilation or locked cooling fan or locked convection fan motor.

H MOTOR WINDING TEST

CARRY OUT 3D CHECKS

Disconnect the leads from the motor.
Using an ohmmeter, check the resistance between the two terminals as described in the table below.

Table: Resistance of Motor

Motors	Resistance
Fan motor	Approximately 200 ohms
Turntable motor	Approximately 16 kohms
Convection fan motor	Approximately 200 ohms

If incorrect readings are obtained, replace the motor.
(Also refer to test procedure I)

CARRY OUT 4R CHECKS

TEST PROCEDURES (CONT'D)

PROCEDURE LETTER	COMPONENT TEST

I LIVE TEST FOR MOTOR WINDINGS

CAUTION: The following procedure requires the oven to be connected to the supply and should only be used if the relevant "cold" checks for the motor under test are inconclusive.

1. CARRY OUT 3D CHECKS
2. Disconnect the leads from the primary of the power transformer. Make sure that the leads remain isolated from other oven components and chassis. (Use insulation tape if necessary.)
3. Connect a voltmeter, set to 250V AC, across the motor terminals. (Refer to the relevant motor test procedure or pictorial diagram for the correct terminal numbers.)
4. Arrange the meter in a position where it can be read during the test. (Do not touch the meter, meter leads or oven circuitry while the oven is active.)
5. Close the oven door.
6. Set the relevant timer for about three (3) minutes, set the power level to HIGH and push the START key.
7. Note the reading on the meter and carefully observe the motor under test to see if it is turning.
8. CARRY OUT 3D CHECKS
9. Remove test meter leads.
10. Reconnect the leads to the primary of the power transformer.

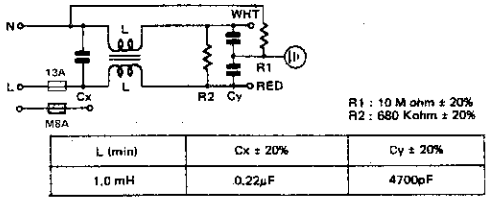
If a reading of 240 volts AC was obtained (step 7) but the motor was not turning then it is faulty and should be replaced. If the meter indicated that no supply was present then the wiring to the motor should be checked for continuity.

J NOISE FILTER TEST

NOISE FILTER TEST

CARRY OUT 3D CHECKS

Disconnect the leads from the terminals of the noise filter.
Using an ohmmeter, check between the terminals as described in the following table.



L (min)	Cx ± 20%	Cy ± 20%
1.0 mH	0.22μF	4700pF

MEASURING POINTS	INDICATION OF OHMMETER
Between N and L	Approximately 680kΩ
Between terminal N and WHITE	Short circuit
Between terminal L and RED	Short circuit

If incorrect readings are obtained, replace the noise filter unit.

CARRY OUT 4R CHECKS

TEST PROCEDURES (CONT'D)

PROCEDURE LETTER	COMPONENT TEST
K	**BLOWN FUSE F2 M8A**

CARRY OUT 3D CHECKS

If the fuse F2 M8A is blown when the door is opened, check the 1st latch switch, monitor switch and monitor resistor.

If the fuse F2 M8A is blown by incorrect door switching replace the defective switch(s) and the fuse F2 M8A.

If the fuse F2 M8A is blown, there is a short in the asymmetric rectifier or there is a ground in wire harness. A short in the asymmetric rectifier may be occured due to short or ground in H.V. rectifier, magnetron, power transformer or H.V. wire. Check them and replace the defective parts or repair the wire harness.

CARRY OUT 4R CHECKS

CAUTION: Only replace fuse with the correct value replacement.

L	**FUSE F1 13A**

CARRY OUT 3D CHECKS

If the fuse F1 13A is blown, there is a shorts or grounds in electrical parts or wire harness. Check them and replace the defective parts or repair the wire harness.

CARRY OUT 4R CHECKS

CAUTION: Only replace weak point with the correct value replacement.

M	**MICRO. COOK RELAY TEST**

CARRY OUT 3D CHECKS

Disconnect the leads to terminals 3 and 4. connect an ohmmeter across the terminals 3 and 4, a reading of approximately 180 ohms should be indicated. If this is not the case then the relay coil is probably faulty and the relay should be replaced.

CARRY OUT 4R TESTS

Relay contact test for open circuit:

Before proceeding with this part of the test, check the relay coil as outlined above.

WARNING: This test requires the oven to be operated with supply connected. Follow the instruction below carefully.

1. CARRY OUT 3D CHECKS
2. Disconnect the leads to the primary of the power transformer.
3. Disconnect the leads from terminals 1 and 2 of the relay, make sure that these leads remain isolated from other components and the oven chasiss (use insulation tape if necessary). Do not disconnect leads from terminal 3 and 4.
4. Securely clip the leads of an ohmmeter across terminals 1 and 2 of the mains relay. (Make sure the meter can be read easily without being touched during test)
5. Close the door of the oven.
6. Connect the supply.
7. Set the MICROWAVE TIMER to 1 minute and press the START key
8. Without touching the meter or any part of the oven make a note of the reading indicated.
9. Set the MICROWAVE TIMER to 0 (zero).

TEST PROCEDURES (CONT'D)

PROCEDURE LETTER	COMPONENT TEST

11. Disconnect the meter from terminals 1 and 2 of the surge relay.
12. Disconnect the meter leads and reconnect the leads to the primary of the power transformer.

Check results:
Both meter reading should show continuity (short circuit), if the reading shows open circuit then the relay contacts are probably faulty and the relay should be replaced.

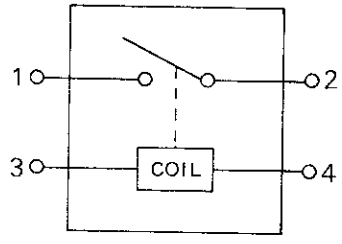
CARRY OUT 4R CHECKS

Relay contact test for short circuit:

CARRY OUT 3D CHECKS

Isolate terminals 1 and 2 of the relay. Using an ohmmeter, check continuity between terminal 1 and 2. A reading of infinite resistance should be obtained. If this is not the case then the relay is probably faulty and should be replaced.

CARRY OUT 4R CHECKS



N **CONVECTION HEATER AND GRILL HEATER TEST**

CARRY OUT 3D CHECKS

Before carrying out the following tests make sure the heater is cool completely.

1. Resistance of heater
   Disconnect the wire leads to the heater to be tested. Using ohmmeter with low resistance range. Check the resistance across the terminals of the heater as described in the folowing table.

Table: Resistance of heater

Parts name	Resistance
Convection heater	Approximately 44 Ω
Grill heater	Approximately 28.7 Ω x 2 = 57.4 Ω

2. Insulation resistance
   Disconnect the wire leads to the heater to be tested. Check the insulation resistance between the element and cavity using a 500V - 100MΩ insulation tester. The insulation resisitance should be more than 10MΩ in the cold start.

If the results of above test 1 and/or 2 are out of above specifications, the heater is probably faulty and should be replaced.

CARRY OUT 4R CHECKS

TEST PROCEDURES (CONT'D)

PROCEDURE LETTER	COMPONENT TEST

O **THERMISTOR TEST**

CARRY OUT 3D CHECKS

Disconnect connector-E from the CPU unit. Measure the resistance of the thermistor with an ohmmeter. Connect the ohmmeter leads to Pin No's E-3 and E-4 of the thermisitor harness.

Room Temp.	Resistance
68°F(20°C) - 86°F(30°C)	Approx. 326kΩ - 175kΩ

If the meter does not indicate above resistance, replace the thermistor.

CARRY OUT 4R CHECKS

P **RELAY TEST**

CARRY OUT 3D CHECKS

Disconnect the leads from the primary of the power transformer. Make sure that the leads remain isolated from other oven components and chassis.(Use insulation tape if necessary.)

Check voltage between Pin Nos. 7 and 9 of the 5-pin connector (A) on the control unit with an A.C. voltmeter. The meter should indicate 240 volts, if not check oven circuit.

Shut-off,Cook and Heater Relay Test
These relays are operated by D.C. voltage.
Check voltage at the relay coil with a D.C. voltmeter during the microwave cooking or convection cooking operation.
DC. voltage indicated .....Defective relay.
DC. voltage not indicated .....Check diode which is connected to the relay coil. If diode is good, control unit is defective.

RELAY SYMBOL	OPERATIONAL VOLTAGE	CONNECTED COMPONENTS
RY1	Approx. 12 V.D.C.	Oven lamp and Turntable motor
RY3	Approx. 13 V.D.C.	Convection heater
RY4	Approx. 13 V.D.C.	Grill heater
RY5	Approx. 14 V.D.C.	Convection motor
RY6	Approx. 12 V.D.C.	Cooling fan motor
Cook Relay	Approx. 13 V.D.C.	Power transformer

CARRY OUT 4R CHECHS

Q **TOUCH CONTROL PANEL ASSEMBLY TEST**

The touch control panel consists of circuits including semiconductors such as LSI, ICs, etc. Therefore, unlike conventional microwave ovens, proper maintenance cannot be performed with only a voltmeter and ohmmeter. In this service manual, the touch control panel assembly is divided into three units, Control Unit, Key Unit and Relay Unit , troubleshooting by unit replacement is described according to the symptoms indicated.

1. Key Unit.
The following symptoms indicate a defective key unit. Replace the key unit.
a) When touching the pads, a certain pad produces no signal at all.
b) When touching a number pad, two figures or more are displayed.
c) When touching the pads, sometimes a pad produces no signal.

2. Control Unit
The following symptoms indicate a defective control unit. Repair the control unit.

TEST PROCEDURES (CONT'D)

PROCEDURE LETTER	COMPONENT TEST

2-1 Programming problems.
a) When touching the pads, a certain group of pads do not produce a signal.

2-2 Display problems.
a) For a certain digit, all or some segments do not light up.
b) For a certain digit, brightness is low.
c) Only one indicator does not light up.
d) The corresponding segments of all digits do not light up; or they continue to light up.
e) Wrong figure appears.
f) A certain group of indicators do not light up.
g) The figure of all digits flicker.

2-3 Other possible problems caused by defective control unit.
a) Buzzer does not sound or continues to sound.
b) Clock does not operate properly.
c) Cooking is not possible.
d) Proper temperature measurement is not obtained.

Note: When defective components,(the Control Unit or Key Unit) are replaced, the defective part or parts must be properly packed for return in the shipping carton, with its cushion material, in which the new replacement part was shipped to you.

R

PROCEDURES TO BE TAKEN WHEN THE FOIL PATTERN ON THE PRINTED WIRING BOARD (PWB) IS OPEN.

To protect the electronic circuits, this model is provided with a fine foil pattern added to the primary on the PWB, this foil pattern acts as a fuse. If the foil pattern is open, follow the troubleshooting guide given below for repair.

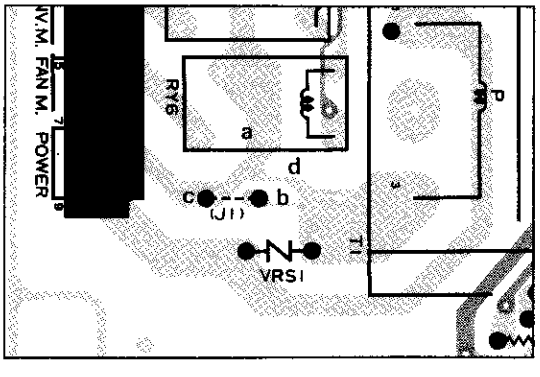
Problem: POWER ON, indicator does not light up.

CARRY OUT 3D CHECKS

Disconnect the leads from the primary of the power transformer. Make sure that the leads remain isolated from other oven components and chassis.(Use insulation tape if necessary.)
Reconnect the supply.

STEPS	OCCURANCE	CAUSE OR CORRECTION
1	The rated voltage is not applied to POWER terminal of CPU connector (CN-A)	Check supply voltage and oven power cord.
2	The rated voltage is applied to primary side of T/C transformer.	T/C transformer or secondary circuit defective. Check and repair.
3	Only pattern at "a" is broken.	*Insert jumper wire 1 and solder. (CARRY OUT 3D CHECKS BEFORE REPAIR)
4	Pattern at "a" and "b" are broken.	*Insert the coil RFILNA003DRE0 between "c" and "d". (CARRY OUT 3D CHECKS BEFORE REPAIR)

NOTE:* At the time of these repairs, make a visual inspection of the varistor for burn damage and test the T/C transformer with an ohmmeter for the presence of layer short-circuit (check primary coil resistance).
If any abnormal condition is detected, replace the defective parts.



CARRY OUT 4R CHECKS

TOUCH CONTROL PANEL ASSEMBLY

OUTLINE OF TOUCH CONTROL PANEL

The touch control section consists of the following units as shown in the touch control panel circuit.

(1) Key Unit
(2) Control Unit

The principal functions of these units and the signals communicated among them are explained below.

Key Unit
The key unit is composed of a matrix, signals generated in the LSI are sent to the key unit through P01,P04,P07,P11,P21,P23 and P26.;.r When a key pad is touched, a signal is completed through the key unit and passed back to the LSI through R0-R3 to perform the function that was requested.

Control Unit
Control unit consists of LSI, power source circuit, synchronizing signal circuit, ACL circuit, buzzer circuit, temperature measurement circuit and indicator circuit.

1) **LSI**
This LSI controls the temperature measurement signal, key strobe signal, relay driving signal for oven function and indicator signal.

2) **Power Source Circuit**
This circuit generates voltages {VA: -17V, VC: -5V, VF1: -25V, VF2: -28V and VP: -34V}necessary in the control unit.

3) **Synchronizing Signal Circuit**
The power source synchronizing signal is available in order to compose a basic standard time in the clock circuit.
It accompanies a very small error because it works on commercial frequency.

4) **ACL Circuit**
A circuit to generate a signal which resets the LSI to the initial state when power is supplied.

5) **Buzzer Circuit**
The buzzer responds to signals from the LSI to emit noticing sounds (key touch sound and completion sound).

6) **Temperature Measurement Circuit(1): Oven**
The temperature in the oven cavity is sensed by the thermistor.
The variation of resistance according to sensed temperature is detected by the temperature measurement circuit and the result applied to LSI.
The result of detecting is given to LSI controlling the relay and display.

7) **Door Switch**
A switch to "tell" the LSI if the door is open or closed.

8) **Relay Circuit**
To drive the magnetron, convection heater, grill heater, convection motor, fan motor, turntable motor and light the oven lamp.

9) **Indicator Circuit**
Indicator element is a Fluorescent Display.
Basically, a Fluorescent Display is a triode having a cathode, a grid and an anode. Usually, the cathode of a Fluorescent Display is directly heated and the filament serves as cathode.
The Fluorescent Display has 6-digits, 17-segments.

DESCRIPTION OF LSI

LSI(IZA380DR)

The I/O signals of the LSI(IZA380DR) are detailed in the following table.

PIN NO.	1	SIGNAL	VREF	I/O	IN

Reference voltage input terminal.
A reference voltage applied to the A/D converter in the LSI. Connected to GND.(0V)

PIN NO.	2	SIGNAL	IN7	I/O	IN

Terminal to change functions according to the model.
Signal in accordance with the model in operation is applied to set up its function.

PIN NO.	3	SIGNAL	IN6	I/O	IN

Terminal not used. Connected to GND.

PIN NO.	4	SIGNAL	IN5	I/O	IN

Heating constant compensation terminal.

PIN NO.	5	SIGNAL	IN4	I/O	IN

Terminal not used. Connected to GND.

PIN NO.	6	SIGNAL	IN3	I/O	IN

Input signal which communicates the door open/close information to LSI.
Door closed; "H" level signal(0V)
Door opened; "L" level signal(-5V)

PIN NO.	7	SIGNAL	IN2	I/O	IN

Temperature measurement input: OVEN THERMISTOR.
By inputting DC voltage corresponding to the temperature detected by the thermistor, this input is converted into temperature by the A/D converter built into the LSI.

PIN NO.	8-9	SIGNAL	IN1-IN0	I/O	IN

Terminal not used. Connected to GND.

PIN NO.	10-14	SIGNAL	P47-P43	I/O	OUT

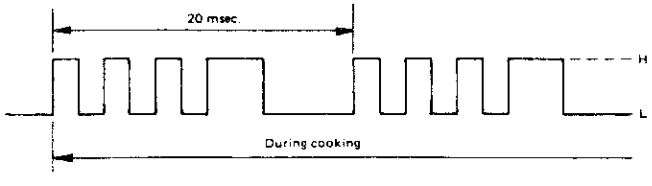
Terminal not used.

PIN NO.	15	SIGNAL	P42	I/O	OUT

Timing signal output terminal for temperature measurement(OVEN).
"H" level (GND) : Temperature measuring timing. (convection and grillcooking).
"L" level (-5V) : Thermistor OPEN timing.

PIN NO.	16	SIGNAL	P41	I/O	OUT

Oven lamp and Turntable motor driving signal (Square waveform: 50Hz).
To turn on and off shut-off relay (RY1). The square waveform voltage is delivered to the RY1 driving circuit and relays (RY3-5,cook relay) control circuit.



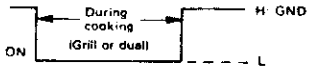
PIN NO.	17	SIGNAL	P40	I/O	OUT

Terminal not used.

PIN NO.	18	SIGNAL	P37	I/O	OUT

Grill heater driving signal.

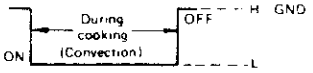
To turn on and off the grill heater relay(RY4). "L"level during grill or dual cooking; "H" level otherwise.



PIN NO.	19	SIGNAL	P36	I/O	OUT

Convection motor driving signal.

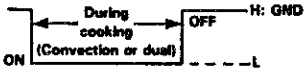
To turn on and off shut-off relay(RY5).
"L"level during convection; "H"level otherwise.



PIN NO.	20	SIGNAL	P35	I/O	OUT

Convection heater driving signal.

To turn on and off the convection heater relay(RY3).
"L"level during convection or dual cooking; "H"level otherwise.
During convection cooking, the signal becomes "H"level when the temperature of the oven cavity exceeds the predetermined temperature.



PIN NO.	21	SIGNAL	P34	I/O	OUT

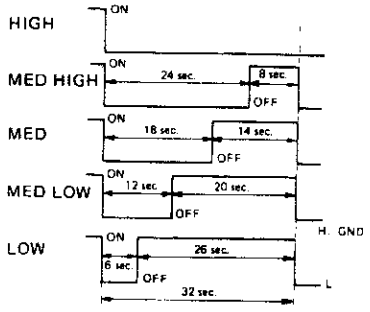
Cooling fan motor driving signal.

To turn on and off the shut-off relay(RY6).
"L"level during cooking: "H" level otherwise

PIN NO.	22	SIGNAL	P33	I/O	OUT

Magnetron high-voltage circuit driving signal.

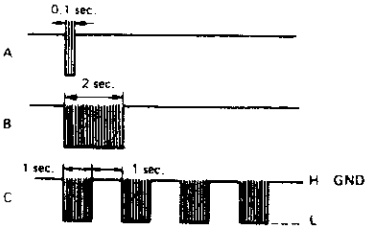
To turn on and off the cook relay.
In high operation, the signals holds "L" level during microwave cooking and "H" level while not cooking.
In other cooking modes (MED HIGH, MED, MED LOW, LOW) the signal turns to "H" level and "L" level in repetition according to the power level.



PIN NO.	23	SIGNAL	P32	I/O	OUT

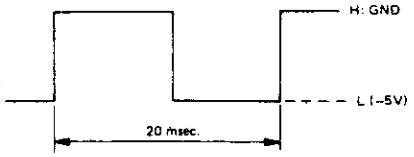
Signal to sound buzzer.

A: Key touch sound.
B: Completion sound.
C: When the temperature of the oven cavity reaches the preset temperature in the preheating mode, or when the preheating hold time (15 minutes) is elapsed.



PIN NO.	24	SIGNAL	P31	I/O	IN

Signal synchronized with commercial power source frequency.
This is the basic timing for all time processing of LSI.



PIN NO.	25	SIGNAL	P30	I/O	OUT

Terminal not used.

PIN NO.	26	SIGNAL	CNVSS	I/O	IN

Connected to Vc.

PIN NO.	27	SIGNAL	RESET	I/O	IN

Auto clear terminal.
Signal is input to reset the LSI to the initial state when power is supplied. Temporarily set to "L" level the moment power is supplied, at this time the LSI is reset. Thereafter set at "H" level.

PIN NO.	28	SIGNAL	XIN	I/O	IN

Internal clock oscillation frequency setting input.
The internal clock frequency is set by inserting the ceramic filter oscillation circuit with respect to XOUT terminal.

PIN NO.	29	SIGNAL	XOUT	I/O	OUT

Internal clock oscillation frequency control output.
Output to control oscillation input of XIN.

PIN NO.	30/31	SIGNAL	XCIN/XCOUT	I/O	IN/OUT

Terminal not used.

PIN NO.	32	SIGNAL	VSS	I/O	IN

Power source voltage: -5V
VC voltage of power source circuit input.

PIN NO.	33	SIGNAL	Ø	I/O	OUT

Terminal not used.

PIN NO.	34	SIGNAL	R3	I/O	IN

Signal coming from touch key.
When either one of G-12 line keys on key matrix is touched, a corresponding signal out of P01,P04,P07,P11,P21,P23 and P26 will be input into R3. When no key is touched, the signal is held at "L" level.

PIN NO.	35	SIGNAL	R2	I/O	IN

Signal similar to R3.
When either one of G-11 line keys on key matrix is touched, a corresponding signal will be input into R2.

PIN NO.	36	SIGNAL	R1	I/O	IN

Signal similar to R3.
When either one of G-10 line keys on key matrix is touched, a corresponding signal will be input into R1.

PIN NO.	37	SIGNAL	R0	I/O	IN

Signal similar to R3.
When either one of G-9 line keys on key matrix is touched, a corresponding signal will be input into R0.

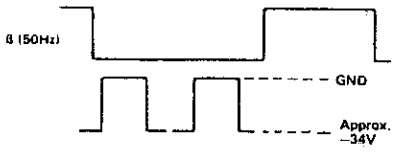
PIN NO.	38	SIGNAL	VP	I/O	IN

Anode (segment) of Fluorescent Display light-up voltage: -34V.
Vp voltage of power source circuit input.

PIN NO.	39-40	SIGNAL	P17-P16	I/O	OUT

Segment data signals.
The relation between signals and indicators are as follows:

Signal	Segment	Signal	Segment
P17	m	P04	h,l
P16	LB1	P02	g
P14	LB2	P01	f
P13	UB1	P00	e
P11	UB2	P26	d
P10	k	P25	c
P07	j	P23	b
P05	i	P21	a

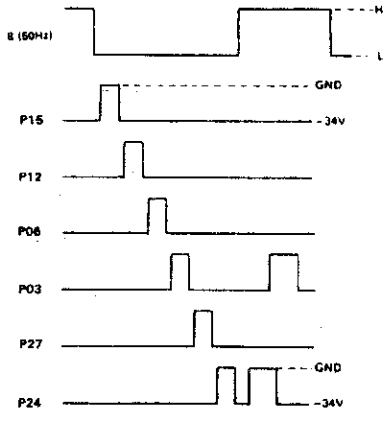


PIN NO.	41	SIGNAL	P15	I/O	OUT

Digit selection signal.
The relation between digit signal and digit are as follows:

Digit signal	Digit
P15	1st.
P12	2nd.
P06	3rd.
P03	4th.
P27	5th.
P24	6th.

Normally, one pulse is output in every ß period, and input to the grid of the Fluorescent Display.



PIN NO.	42-43	SIGNAL	P14-P13	I/O	OUT

Segment data signal. Signal similar to P17.

PIN NO.	44	SIGNAL	P12	I/O	OUT

Digit selection signal. Signal similar to P15.

PIN NO.	45	SIGNAL	P11	I/O	OUT

Segment data signal.
Signal similar to P17.

Key strobe signal.
Signal applied to touch-key section. A pulse signal is input to R0-R3 terminal while one of G-1 line keys on key matrix is touched.

PIN NO.	46	SIGNAL	P10	I/O	OUT

Segment data signal. Signal similar to P17.

PIN NO.	47	SIGNAL	P07	I/O	OUT

Segment data signal.
Signal similar to P17.

Key strobe signal.
Signal applied to touch-key section. A pulse signal is input to R0-R3 terminal while one of G-3 line keys on key matrix is touched.

PIN NO.	48	SIGNAL	P06	I/O	OUT

Digit selection signal. Signal similar to P15.

PIN NO.	49	SIGNAL	P05	I/O	OUT

Segment data signal. Signal similar to P17.

PIN NO.	50	SIGNAL	P04	I/O	OUT

Segment data signal.
Signal similar to P17.

Key strobe signal.
Signal applied to touch-key section. A pulse signal is input to R0-R3 terminal while one of G-5 line keys on key matrix is touched.

PIN NO.	51	SIGNAL	P03	I/O	OUT

Digit selection signal. Signal similar to P15.

PIN NO.	52	SIGNAL	P02	I/O	OUT

Segment data signal. Signal similar to P17.

PIN NO.	53	SIGNAL	P01	I/O	OUT

Segment data signal.
Signal similar to P17.

Key strobe signal.
Signal applied to touch-key section. A pulse signal is input to R0-R3 terminal while one of G-4 line keys on key matrix is touched.

PIN NO.	54	SIGNAL	P00	I/O	OUT

Segment data signal. Signal similar to P17.

PIN NO.	55	SIGNAL	P27	I/O	OUT

Digit selection signal. Signal similar to P15.

PIN NO.	56	SIGNAL	P26	I/O	OUT

Segment data signal.
Signal similar to P17.

Key strobe signal.
Signal applied to touch-key section. A pulse signal is input to R0-R3 terminal while one of G-2 line keys on key matrix is touched.

PIN NO.	57	SIGNAL	P25	I/O	OUT

Segment data signal. Signal similar to P17.

PIN NO.	58	SIGNAL	P24	I/O	OUT

Digit selection signal. Signal similar to P15.

PIN NO.	59	SIGNAL	P23	I/O	OUT

Segment data signal.
Signal similar to P17.

Key strobe signal.
Signal applied to touch-key section. A pulse signal is input to R0-R3 terminal while one of G-7 line keys on key matrix is touched.

PIN NO.	60	SIGNAL	P22	I/O	OUT

Terminal not used.

PIN NO.	61	SIGNAL	P21	I/O	OUT

Segment data signal.
Signal similar to P17.

Key strobe signal.
Signal applied to touch-key section. A pulse signal is input to R0-R3 terminal while one of G-6 line keys on key matrix is touched.

PIN NO.	62	SIGNAL	P20	I/O	OUT

Terminal not used.

PIN NO.	63/64	SIGNAL	AVCC/VCC	I/O	IN

Connected to GND.

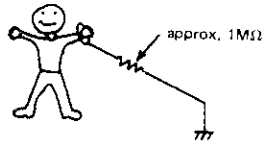
SERVICING

1. Precautions for Handling Electronic Components

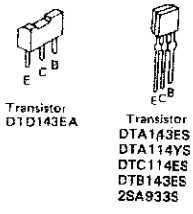
This unit uses PMOS LSI in the integral part of the circuits. When handling these parts, the following precautions should be strictly followed.

PMOS LSI have extremely high impedance at its input and output terminals. For this reason, it is easily influenced by the surrounding high voltage power source, static electricity charge in clothes, etc,and sometimes it is not fully protected by the built-in protection circuit.

1) When storing and transporting, thoroughly wrap them in aluminum foil.
   Also wrap all PW boards containing them in aluminium foil.
2) When soldering, ground the technician as shown in the figure and use grounded soldering iron and work table.



2. Shapes of Electronic Components



3. Servicing of Touch Control Panel

We describe the procedures to permit servicing the touch control panel of the microwave oven and the caution you must consider when doing so.

To carry the servicing, power supply to the touch control panel is available either from the power line of the oven proper itself of from an external power source.

(1) Servicing the touch control panel with power supply from the oven proper:

CAUTION:

THE HIGH VOLTAGE TRANSFORMER OF THE MICROWAVE OVEN IS STILL A LIVE TO GIVE YOU DANGER DURING SERVICING.

Therefore, when checking the performance of the touch control panel,put the outer cabinet on the oven proper to keep you from touching the high voltage transformer, or unplug the primary terminal (connector) of the high power transformer to turn it off; and the end of such connector shall be insulated with an insulating tape. After servicing, be sure to replace the leads to their original locations.

A. On some models, the power supply cord between the touch control panel and the oven proper is so short that they can't be separated from each other.
   For those models, therefore, check and repair all the controls (with the sensor-related ones included) of the touch control panel while keeping it in contact with the oven proper.
B. On some models, on the other hand, the power supply cord between the touch control panel and the oven proper is so long that they may be separated from each other. For those models, therefore, it is allowed to check and repair the controls of the touch control panel while keeping it apart from the oven proper;in this case you must short both ends of the door sensing switch (on PWB) of the touch control panel with a jumper, which brings about an operational state that is equivalent to that with the oven door being closed.
   As to the sensor-related controls of the touch control panel, their checking is allowed if the dummy resistor(s) whose resistance is equal to that of those controls is used.

(2) Servicing the touch control panel with power supply from an external power source:

Disconnect the touch control panel completely from the oven power, and short both ends of the door sensing switch (on PWB) of the touch control panel,which brings about such an operational state that is equivalent to that with the oven door being closed. And connect an external power source to the power input terminal of the touch control panel, and then it is allowed to check and repair the controls of the touch control panel; as in the case of (1) B above, it is here also possible to check the sensor-related controls of the touch control panel by using the dummy resistor(s).

4. Servicing Tools

Tools required when servicing the touch control panel assembly.

1) Soldering iron: 30W
(To prevent leaking current, it is recommended to use a soldering iron with grounding terminal.)
2) Oscilloscope: Single beam, frequency range: DC - 10MHz type or more advanced model.
3) Others: Hand tools

5. Other Precautions

1) When turning on the power source of the control unit, remove the aluminum foil applied for preventing static electricity.
2) Connect the connectors of the indicator and key unit to the control unit taking care that the lead wires are not twisted.
3) After aluminum foil is removed, take extra care that abnormal voltage due to static electricity etc. is not applied to the input or output terminals.
4) Attach connectors, electrolytic capacitors, etc. to PWB, taking care that all connections are tight.
5) Be sure to use specified components where high precision is required.

COMPONENT REPLACEMENT AND ADJUSTMENT PROCEDURE

WARNING: Avoid possible exposure to microwave energy. Please follow the instructions below before operating the oven.

1. CARRY OUT 3D CHECKS.
2. Make sure that a definite "click" can be heard when the microwave oven door is unlatched. (Hold the door in a closed position with one hand, then push the door open button with the other, this causes the latch heads to rise, it is then possible to hear a "click" as the door switches operate.)
3. Visually check the door and cavity face plate for damage (dents, cracks, signs of arcing etc.).

Carry out any remedial work that is necessary before operating the oven. Do not operate the oven if any of the following conditions exist;

1. Door does not close firmly.
2. Door hinge, support or latch hook is damaged.
3. The door gasket or seal is damaged.
4. The door is bent or warped.
5. There are defective parts in the door interlock system.
6. There are defective parts in the microwave generating and transmission assembly.
7. There is visible damage to the oven.

Do not operate the oven:

1. Without the RF gasket (Magnetron).
2. If the wave guide or oven cavity are not intact.
3. If the door is not closed.
4. If the outer case (cabinet) is not fitted.

Please refer to 'OVEN PARTS, CABINET PARTS, DOOR PARTS', when carrying out any of the following removal procedures:

OUTER CASE REMOVAL

To remove the outer case, proceed as follows.

1. Disconnect oven from power supply.
2. Open the oven door and wedge it open.
3. Remove one (1) screw holding air duct to rear cabinet.
4. Remove the screws from rear and along the side edge of case.
5. Slide the entire case back about 1 inch (3cm) to free it from retaining clips on the cavity face plate.
6. Lift the entire case from the oven.
7. Discharge the HV capacitor before carring out any further work.
8. Do not operate the oven with the outer case removed.

N.B.; Step 1,2 and 7 form the basis of the 3D checks.

CAUTION:
DISCHARGE HIGH VOLTAGE CAPACITOR BEFOR TOUCHING ANY OVEN COMPONENTS OR WIRING.

HIGH VOLTAGE COMPONENTS REMOVAL (HIGH VOLTAGE CAPACITOR AND HIGH VOLTAGE RECTIFIER ASSEMBLY)

To remove the components, proceed as follows.

1. CARRY OUT 3D CHECKS
2. Remove two (2) screws holding capacitor holder to rear cabinet.
3. Remove one (1) screw holding earth side terminal of high voltage rectifier assembly, and remove capacitor holder.
4. Disconnect all the leads and terminals of high voltage rectifier assembly from high voltage capacitor. Now, high voltage rectifier assembly and high voltage capacitor should be free.

CAUTION:
WHEN REPLACING HIGH VOLTAGE RECTIFIER ASSEMBLY, ENSURE THAT THE CATHODE (EARTH) CONNECTION IS SECURELY FIXED TO THE CHASSIS WITH A EARTHING SCREW.

POWER TRANSFORMER REMOVAL

1. CARRY OUT 3D CHECKS
2. Disconnect the wire leads from power transformer
3. Disconnect the leads from magnetron filament.
4. Disconnect the leads of the power transformer from high voltage capacitor.
5. Releace the leads from the hole of air guide C.
6. Remove the purse lock " M " from the leads.
7. Remove the tube from the leads of power transformer and the H.V.wire.
8. Remove the two (2) screws holding the transformer to bottom plate.
9. Remove the transformer.

CAUTION:
DO NOT REPLACE ONLY HIGH VOLTAGE RECTIFIER. WHEN REPLACING IT, REPLACE HIGH VOLTAGE RECTIFIER ASSEMBLY.

CONTROL PANEL REMOVAL

1. CARRY OUT 3D CHECKS
2. Disconnect the connectors from touch control panel.
3. Remove the three (3) screws holding the control panel plate to the oven cavity and remove the control panel.
   Lift up the control panel assembly and pull it forward. Now, the control panel assembly is free.

MAGNETRON AND FAN MOTOR REMOVAL

MAGNETRON

1. Remove the four (4) screws holding the chassis suport.
2. Disconnect the wire leads from magnetron.
3. Remove the four (4) screws holding the magnetron to the waveguide.
4. Remove the magnetron from waveguide.
5. Now, the magnetron is free.

CAUTION:
WHEN REPLACE THE MAGNETRON, BE SURE THE R.F. GASKET IS IN PLACE AND THE MAGNETRON MOUNTING SCREWS TIGHEND SECURELY.

FAN MOTOR

1. Remove the four (4) screws holding the chassis support.
2. Disconnect the wire leads from the fan motor and thermal cut-out.
3. Remove the two (2) screws holding the fan duct to the waveguide.
4. Release the fan duct from the oven cavity.
5. Remove the two (2) screws holding the fan motor angle to the fan duct.
6. Remove the one (1) screw and one (1) nut holding the thermal cut-out angle
7. Remove the fan blade from the fan motor.
8. Remove the two (2) screws holding the fan motor.
9. Now, the fan motor is free.

CONVECTION HEATER OR CONVECTION FAN MOTOR REMOVAL

1. CARRY OUT3DCHECKS.
2. Remove the two (2) screws holding the capacitor holder to the rear cabinet and release the capacitor holder from the rear cabinet.
3. Remove the eight(8) screws holding the rear cabinet and rear barrier to the bottom plate and chassis support.
4. Remove the back plate cushion.
5. Now the rear cabinet is free.
6. Disconnect the wire leads from the convection heater, convection motor and thermistor.
7. Remove the five(5) screws holding the convection fan duct to the oven cavity from out-side.
8. Remove the four(4) screws and four(4) nuts holding the convection fan duct to the oven cavity.
9. Now the convection fan duct is free.

CONVECTION HEATER

10. Remove the two (2) screws holding the convection air angle A to the convection fan duct and remove the one (1) screw holding covection heater angle.
11. Remove the two(2) screws holding the convection heater to the convection fan duct.
12. Now, the convection heater is free.

CONVECTION FAN MOTOR

10. Remove the one(1) nut holding the convection fan, washers, pipe and auxiliary fan to the convection fan motor shaft.
11. Remove the two(2) screws holding the convection motor mounting plate to the convection fan duct.
12. Remove the pin on the convection fan motor shaft.
13. Remove the two(2) screws holding the convection motor mounting plate to the convection fan motor.
14. Now, the convection fan motor is free.

TURNTABLE MOTOR REMOVAL

1. Disconnect the oven from power supply.
2. Remove the turntable and roller stay from the oven cavity.
3. Remove one(1) screw holding the turntable motor cover to the bottom plate and remove the cover.
4. Disconnect wire leads from the turntable motor.
5. Remove the two (2) screws holding the turntable motor to the thermal cover bottom and move the motor.
6. The turntable motor is now free.

POSITIVE LOCK® CONNECTOR REMOVAL

Pushing the lever of positive lock® connector.
Pull out the positive lock® connector.

CAUTION:
When you (Service engineers) connect the positive lock® connectors to the terminals, connect the positive lock® so that the lever face you (Service engineer).

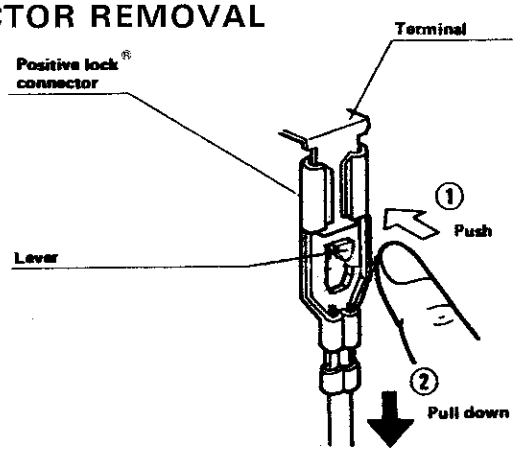


Figure C-1. Positive lock® connector

GRILL HEATER REMOVAL

1. CARRY OUT 3D CHECKS
2. Disconnect the wire leads to the grill heater.
3. Remove the two(2) screws holding the exhaust duct assembly to the oven cavity.
4. Remove the one(1) screw and one(1) nut holding the grill heater to the oven cavity.
5. Release the grill heater from the oven cavity by sliding the cover.
6. Now the grill heater is free.

Note: When the coupling or O-ring is replaced to new one, the grease (Shinetsu Silicone grease G420 of Shinetsu Chemical Co.Ltd.) must be applid as as shown illustration
If the grease is not applied, the coupling and O-ring may be damaged.

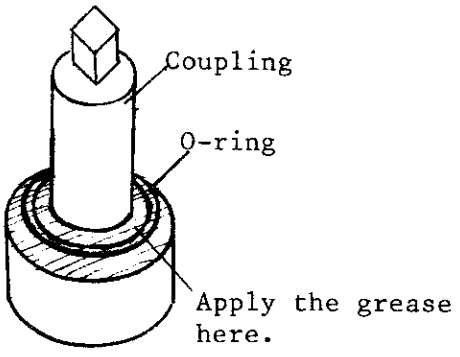


Figure C-2. Grease apllying position

OVEN LAMP SOCKET REMOVAL

1. CARRY OUT 3D CHECKS
2. Pull the wire leads from the oven lamp socket by pushing the terminal hole of the oven lamp socket with the flat type small screw driver.
3. Lift up the oven lamp socket.
4. Now, the oven lamp socket is free.

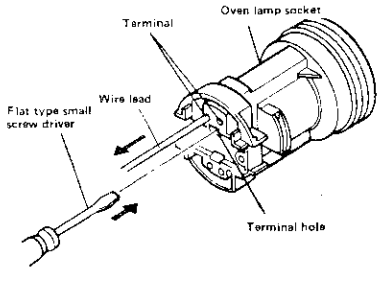


Figure C-3. Oven lamp socket

POWER SUPPLY CORD REPLACEMENT

Removal

1. CARRY OUT 3D CHECKS.
2. Remove the single (1) screw holding the green/yellow wire to the rear cabinet.
3. Disconnect the leads of the power supply cord from the noise filter, referring to the Figure C-4 (a).
4. Release the power supply cord from the rear cabinet.
5. Now, the power supply cord is free.

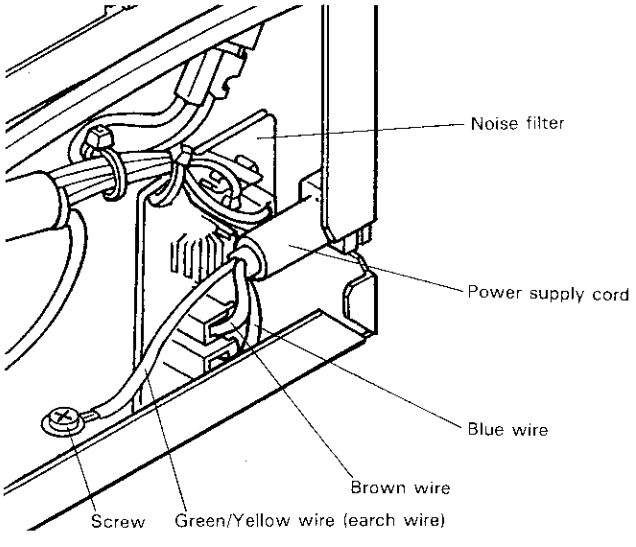


Figure C-4 (a) Replacement of Power Supply Cord

Re-install

1. Insert the moulding cord stopper of power supply cord into the square hole of the rear cabinet, referring to the Figure C-4 (b). Installation of Power supply cord.
2. Install the earth wire lead of power supply cord and earth angle to the rear cabinet with one (1) screw and tight the screw.
3. Connect the brown and blue wire leads of power supply cord to the noise filter correctly, referring to the Pictorial Diagram.

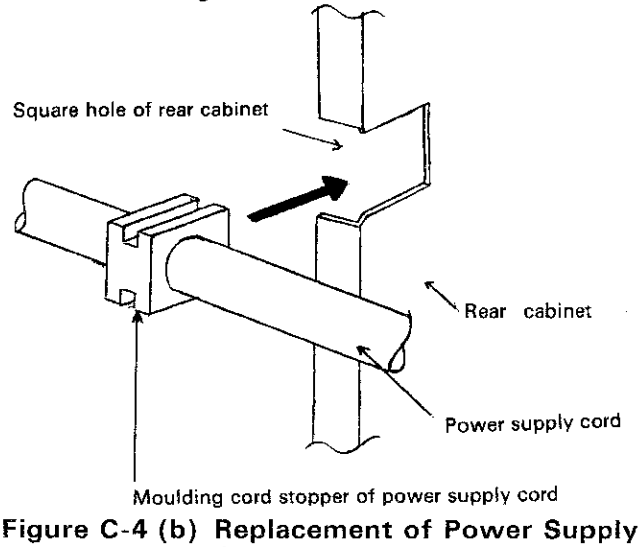


Figure C-4 (b) Replacement of Power Supply Cord

1ST LATCH SWITCH, 2ND LATCH SWITCH, STOP SWITCH AND MONITOR SWITCH REMOVAL

1. CARRY OUT 3D CHECKS.
2. Remove the control panel refering to "CONTROL PANEL REMOVAL".

EXAMPLE: 1ST LATCH SWITCH REMOVAL IN THE UPPER LATCH HOOK

3. Disconnect the wire leads from the switches.
4. Remove the one (1) screw holding the upper latch hook to the oven cavity.
5. Remove the upper latch hook from the oven cavity.
6. Pushing the retaining tab, push the 1st latch switch downwards.

EXAMPLE: MONITOR SWITCH REMOVAL

6. Pushing the retaining tab, push the monitor switch rightwards.

(OTHER SWITCHES REMOVAL)

The other switches can be removed by the same procedure above.

CAUTION: WHEN REMOVING THE SWITCHES, DON'T BREAK THE TABS OF THE LATCH HOOKS.

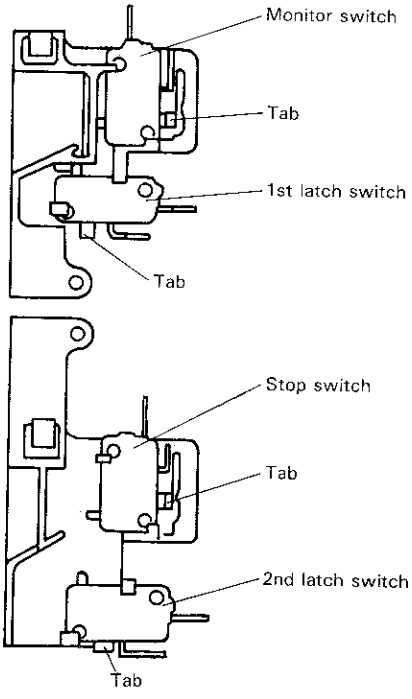


Figure C-5. How to remove the switches

1ST LATCH SWITCH, 2ND LATCH SWITCH, STOP SWITCH AND MONITOR SWITCH ADJUSTMENT

If the 1st and 2nd latch switches and monitor switch and stop switch do not operate properly due to a mis-adjustment, the following adjustment should be made.

1. Loosen the one (1) screw holding the upper latch hook to the oven cavity front flange and the one (1) screw holding the lower latch hook to the same flange.
2. With the door closed, adjust lower latch hook by moving it back and foward or up and down and then adjust the upper latch hook by moving it back and foward, or up and down. In and out play of the door allowed by the upper and lower latch hooks should be less than 0.5 mm. The vertical position of the upper latch hook and lower latch hook should be placed where the two (2) switches on each latch switches have activated with the door closed.
3. Secure the screws with washers firmly.
4. Make sure of the all latch switches operation. If the any switch has not activated with the door closed, loose one (1) screw holding upper latch hook or lower latch hook to oven cavity front flange and adjust upper latch hook or lower latch hook position.
5. Make sure 1st latch switch operate before 2nd latch switch when open the door.

After adjustment, make sure of the following:

1. In and out play of door remains less than 0.5 mm when latched position. First check upper latch hook position, pushing and pulling upper portion of door toward the oven face. Then check the lower latch hook position, pushing and pulling lower portion of door toward the oven face. Both results (plays of the door) should be less than 0.5mm.
2. The 1st and 2nd latch switches interrupt the circuit before the door can be opened.
3. The monitor switch contacts (COM.– NC.) close when the door is opened and the stop switch contacts open when the door is opened.
4. Re-install outer case and check for microwave leakage around the door with an approved microwave survey meter. (Refer to Microwave Measurement Procedure.)

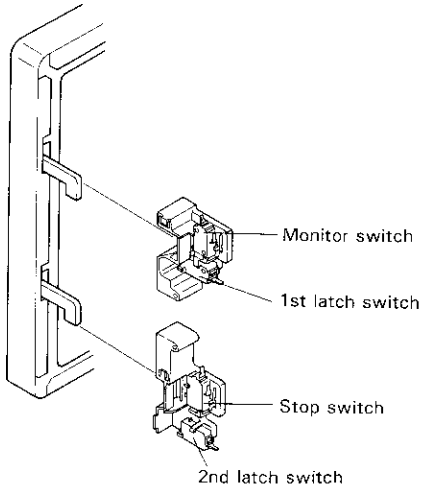


Figure C-6. Switch Adjustments

DOOR FRAME AND REMOVAL

Remove the door assembly, referring to from item 1 through item 4 of "DOOR REPLACEMENT".

1. Place the door assembly on a soft cloth with facing up.
2. Remove the choke cover, referring to "CHOKE COVER REMOVAL".
3. Remove the six (6) screws holding the door frame to the door panel assembly.
4. Release the door frame from the door assembly, now the door frame is free.
5. Remove the one (1) screw top of the frame inside.
6. Slide the door glass to the up side until stopped by door frame.
7. Lift up the door glass, now the door glass is free.

DOOR REPLACEMENT AND ADJUSTMENT

DOOR REPLACEMENT

1. CARRY OUT 3D CHECKS
2. Remove six (6) screws holding the upper and lower oven hinge to the oven cavity. The lower oven hinge is now free.
3. Remove door assembly with upper oven hinge by pulling it forward.
4. Separate the door assembly and upper oven hinge. Door assembly is now free.
5. Re-install upper oven hinge to the new door assembly.
6. On re-installing new door assembly, secure the upper and lower oven hinges with the six (6) mounting screws to the oven cavity. Make sure the door is parallel with bottom line of the oven face plate and the latch head pass through the latch holes correctly.
7. CARRY OUT 4R CHECKS

Note: After any service to the door, the approved microwave survey meter should be used to assure in compliance with proper microwave radiation standards. (Refer to Microwave Measurement Procedure.)

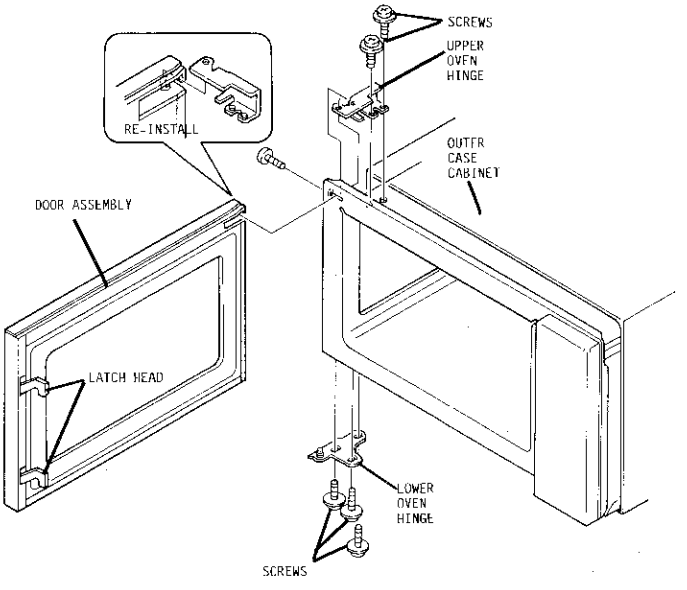


Figure C-7. Door Assembly Replacement and Adjustment

DOOR ADJUSTMENT

When removing and/or loosening hinges such as in door replacement, the following adjustment criteria are taken. Door is adjusted to meet the following three conditions by keeping screws of hinge loose.

1. Adjust door latch heads at a position where they smoothly catch the latch hook through the latch holes. Refer to latch switch adjustments.
2. Deviation of the door alignment from horizontal line of cavity face plate is to be less than 1.0mm.
3. The door is positioned with its face depressed toward the cavity face plate.
4. Reinstall outer case and check for microwave leakage around the door with an approved microwave survey meter. (Refer to Microwave Measure ment Procedure.)

LATCH HEAD REMOVAL

1. Insert an iron plate(thickness of about 0.5mm)
1. Release the latch spring from the tabs of the door panel.
2. Release th elatch spring from the latch head.
3. Release the latch head from the door panel.
4. Now, the latch head is free.

CHOKE COVER REMOVAL

1. Insert an iron plate(thickness of about 0.5mm) or flat type screw driver to the gap between the choke cover and door panel as shown figure to free the engagind part. The protect sheet may be used not to damage the door panel.
2. Lift up the choke cover, now choke cove is free.

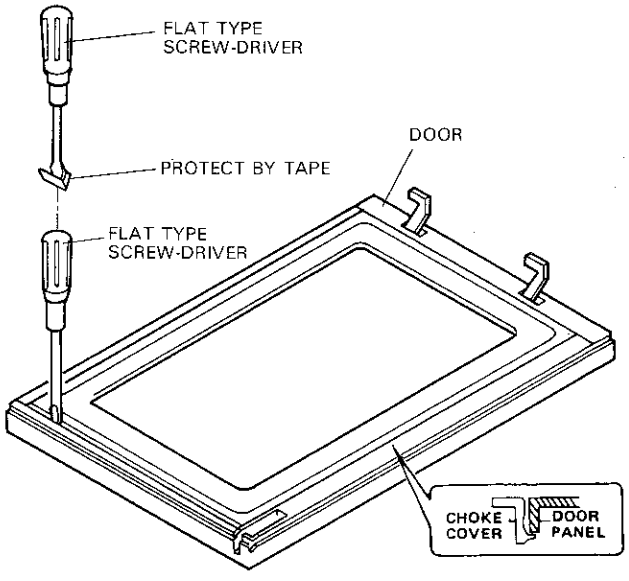


Figure C-8. Choke Cover Removal

MICROWAVE MEASUREMENT

After adjustment of door latch switches, monitor switch and door are completed individually or collectively, the following leakage test must be performed with a survey instrument and it must be confirmed that the result meets the requirements of the performance standard for microwave oven.

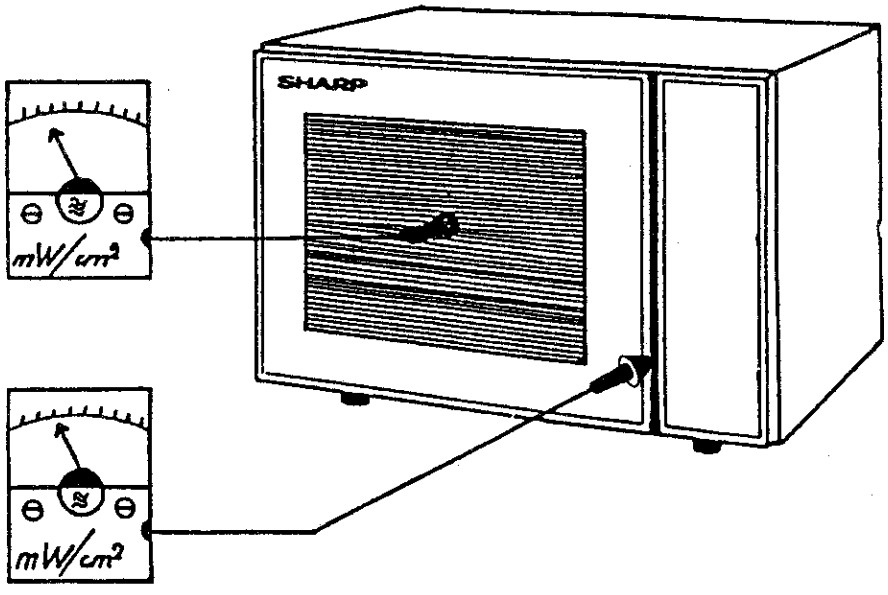
REQUIREMENT

The safety switch must prevent microwave radiation emission in excess of 5mW/cm2 at any point 5cm or more from external surface of the oven.

PREPARATION FOR TESTING:

Before beginning the actual test for leakage, proceed as follows;

1. Make sure that the test instrument is operating normally as specified in its instruction booklet.
   Important:
   Survey instruments that comply with the requirement for instrumentations as prescribed by the performance standard for microwave ovens must be used for testing.
   Recommended instruments are:
   NARDA 8100
   NARDA 8200
   HOLADAY HI 1500
   SIMPSON 380M
2. Place the oven tray into the oven cavity.
3. Place the load of 275±15ml of water initially at 20±5°C in the center of the oven tray. The water container should be a low form of 600 ml beaker with inside diameter of approx. 8.5cm and made of an electrically non-conductive material such as glass or plastic.
   The placing of this standard load in the oven is important not only to protect the oven, but also to insure that any leakage is measured accurately.
4. Close the door and turn the oven ON with the timer set for several minutes. If the water begins to boil before the survey is completed, replace it with 275ml of cool water.
5. Move the probe slowly (not faster that 2.5cm/sec.) along the gap.
6. The microwave radiation emission should be measured at any point of 5cm or more from the external surface of the oven.



Microwave leakage measurement at 5 cm distance

TEST DATA AT A GLANCE

Parts	Symbol	Value / Data
Fuse	F1	13A 250V
Fuse	F2	M8A 250V
Monitor resistor	R1	0.8Ω 20W
Conv. thermal cut-out	TC3	160°C
Temp. fuse	TF	150°C
Thermal cut-out	TC1	95°C
Grill thermal cut-out	TC2	160°C
Micro. cook relay	RY-2	Approx. 180Ω
Grill heater	GH	Approx. 28.7 Ω x 2 = 57.4 Ω Insulation resistance > 10MΩ
Convection heating	CH	Approx. 44Ω Insulation resistance > 10MΩ
Oven lamp	OL	220–250 V 25W E14
High voltagr capacitor	C	1.13μF AC 2100V
Thermistor		Approx. 326 kΩ -- 175 kΩ At 20°C -- 30°C
Magnetron	MG	Filament < 1Ω Filament – chassis ∞ ohm.
Power transformer	T	Filament winding < 1Ω Secondary winding Approx. 85.2Ω Primary winding Approx. 1.536Ω

TEST POINTS ON CONTROL UNIT (on "ON" CONDITION)

In/Out put terminal	Test point	Volt	Resistance (Disconnect the power plug and door is closed)
Input terminal (power supply)	A7– A9	240V	Approx. 772Ω
Input terminal (stop switch)	E1– E2	–	0
Input terminal (Themistor)	E3– E4	DC. 5V	Approx. 53kΩ at 20°C -- 30°C
Output terminal (Grill heater)	A9– C6	240V	Approx. 56Ω
Output terminal (Convection heater)	A9– C1	240V	Approx. 43Ω
Output terminal (Fan motor)	A9– A5	240V	Approx. 205Ω
Output terminal (Turntable motor and oven lamp)	A9– A1	240V	Approx. 161Ω
Output terminal (Convection fan motor)	A9– A3	240V	Approx. 164Ω
Output terminal (Micro.cook relay)	E5– E6	DC. 12V	Approx. 175Ω
Output terminal (Earth)	E2– Chassis	–	0

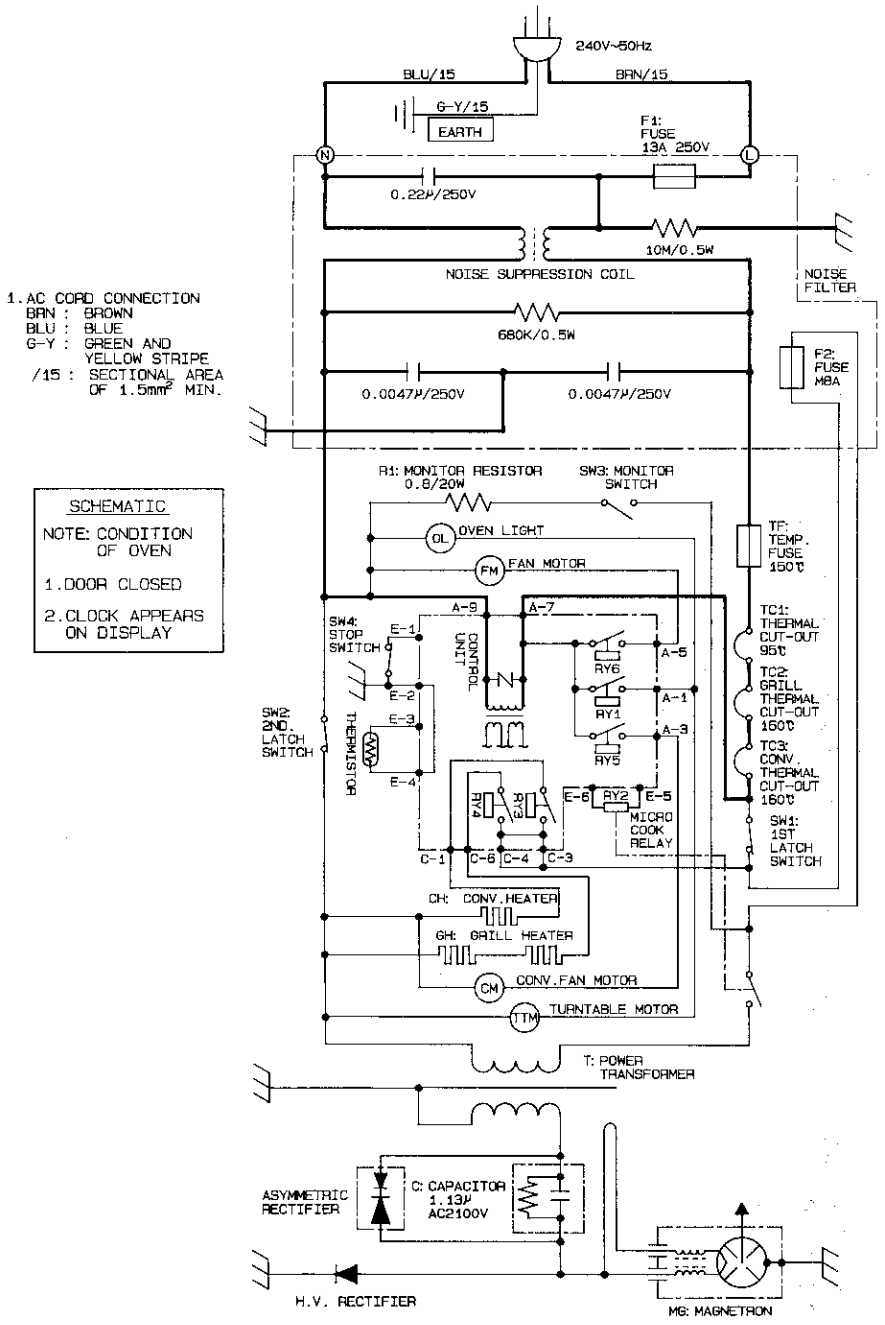


Figure 0-1. Oven Schematic-OFF Condition

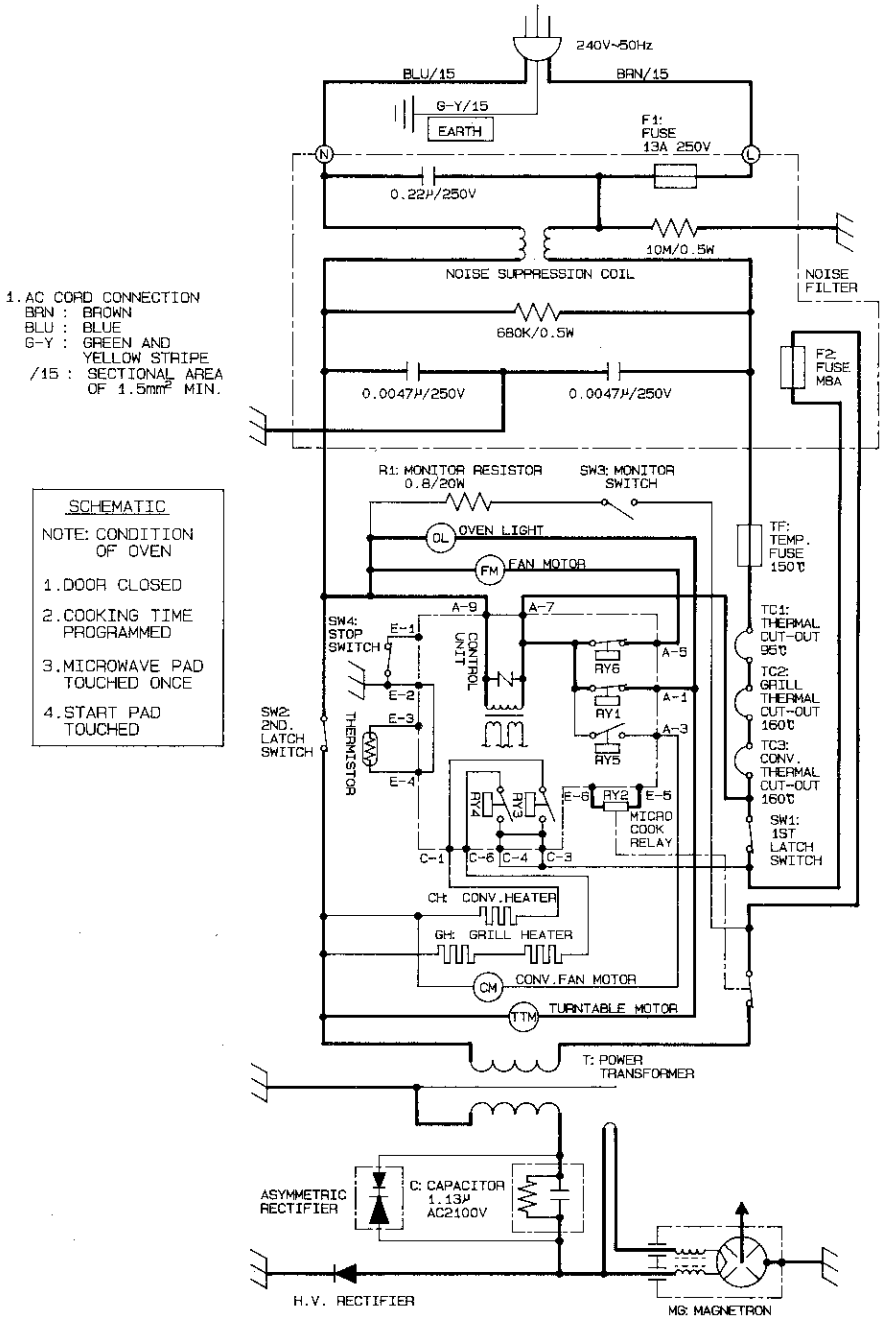


Figure 0-2. Oven Schematic-Microwave Cooking Condition

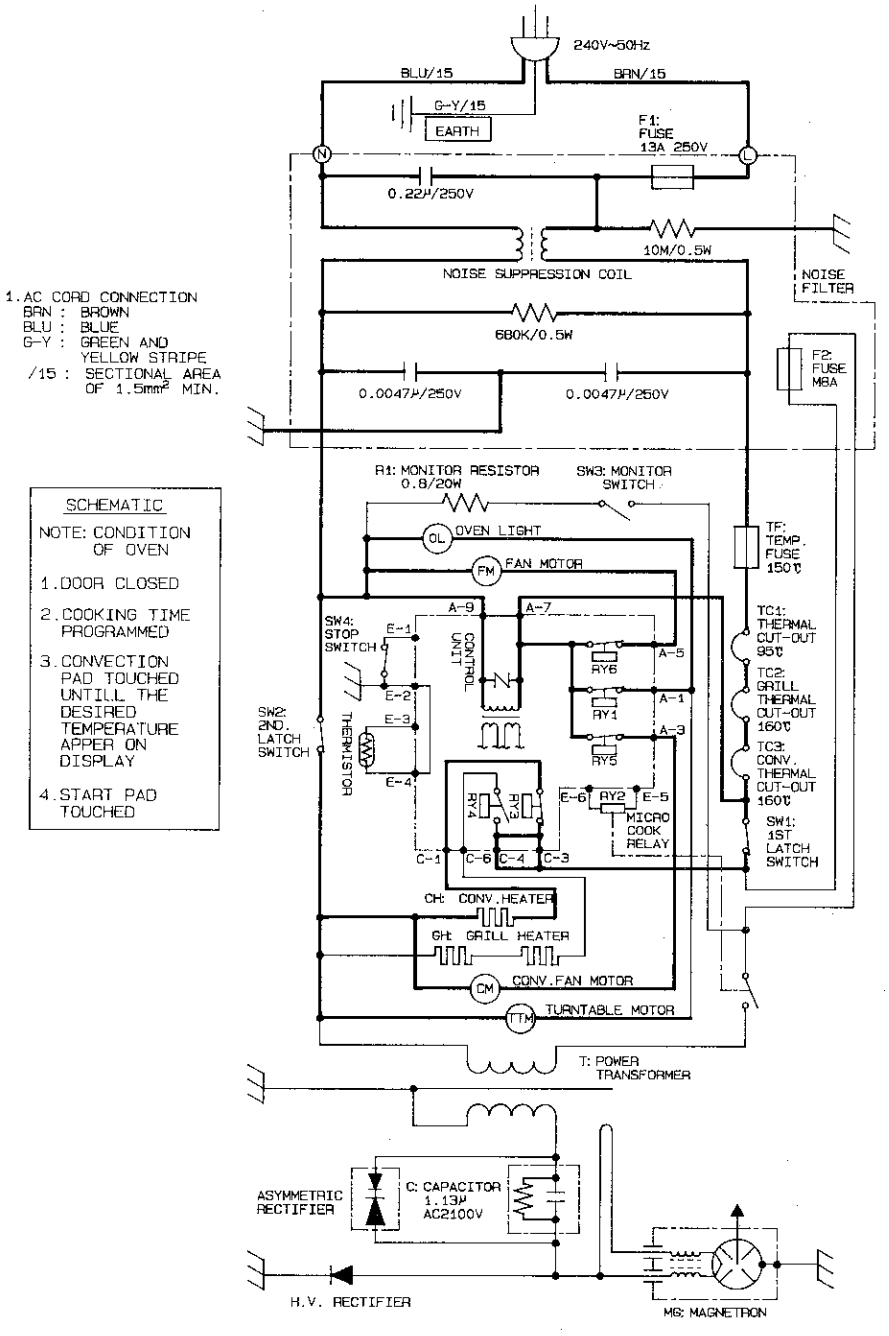


Figure 0-3. Oven Schematic-Convection Cooking Condition

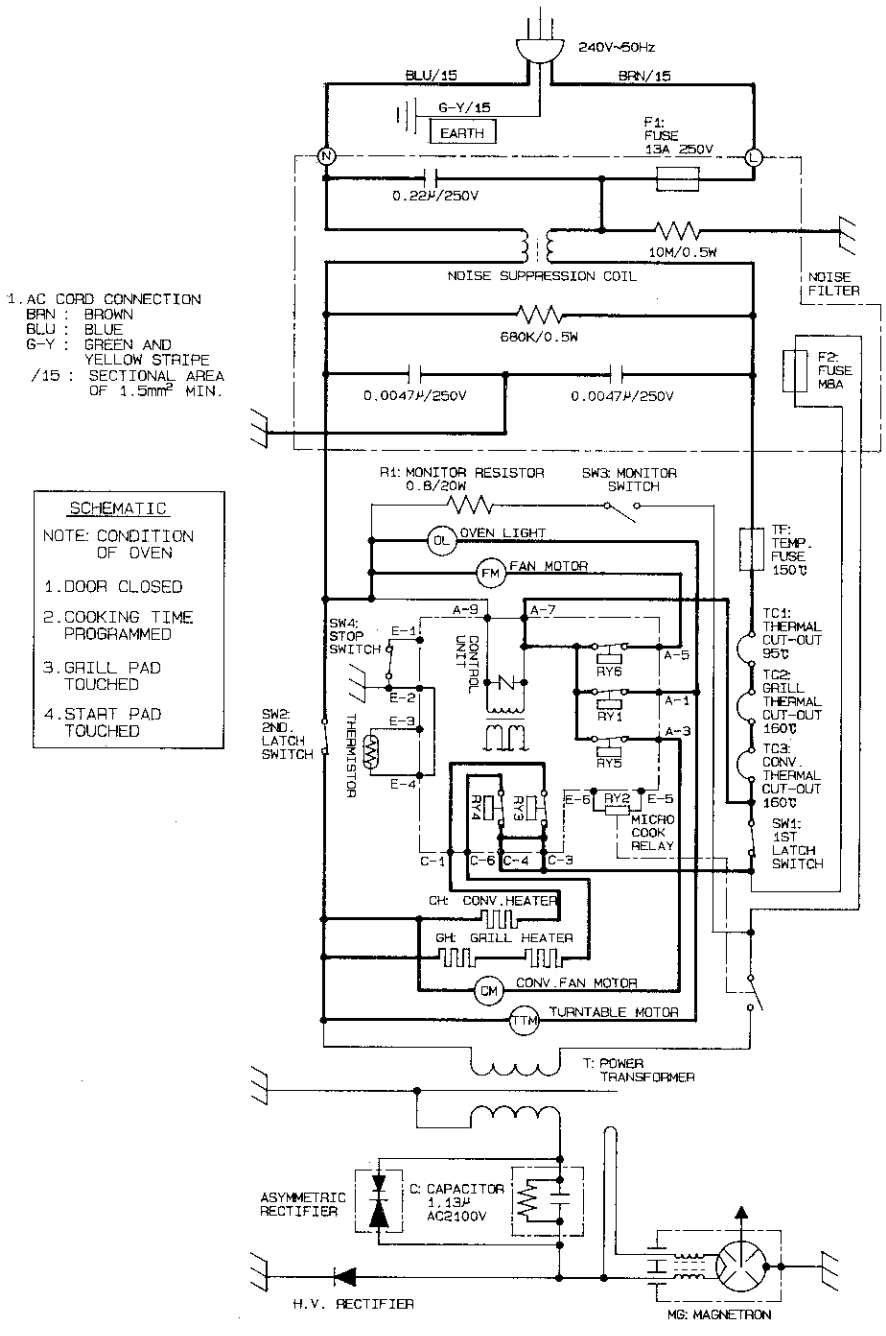


Figure 0-4. Oven Schematic-Grill Cooking Condition

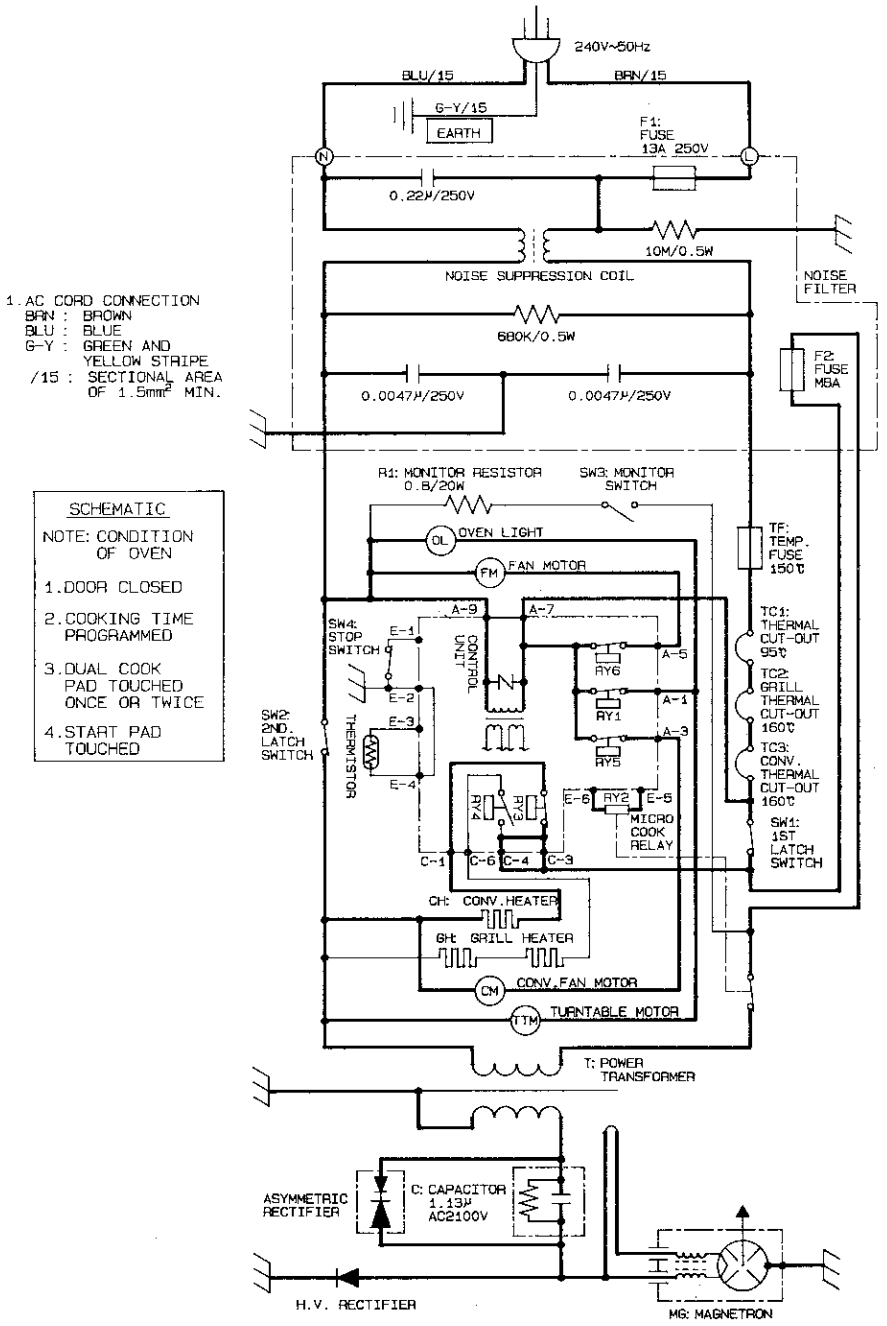


Figure 0-5. Oven Schematic-Dual Cook (Roast/Bake) Condition

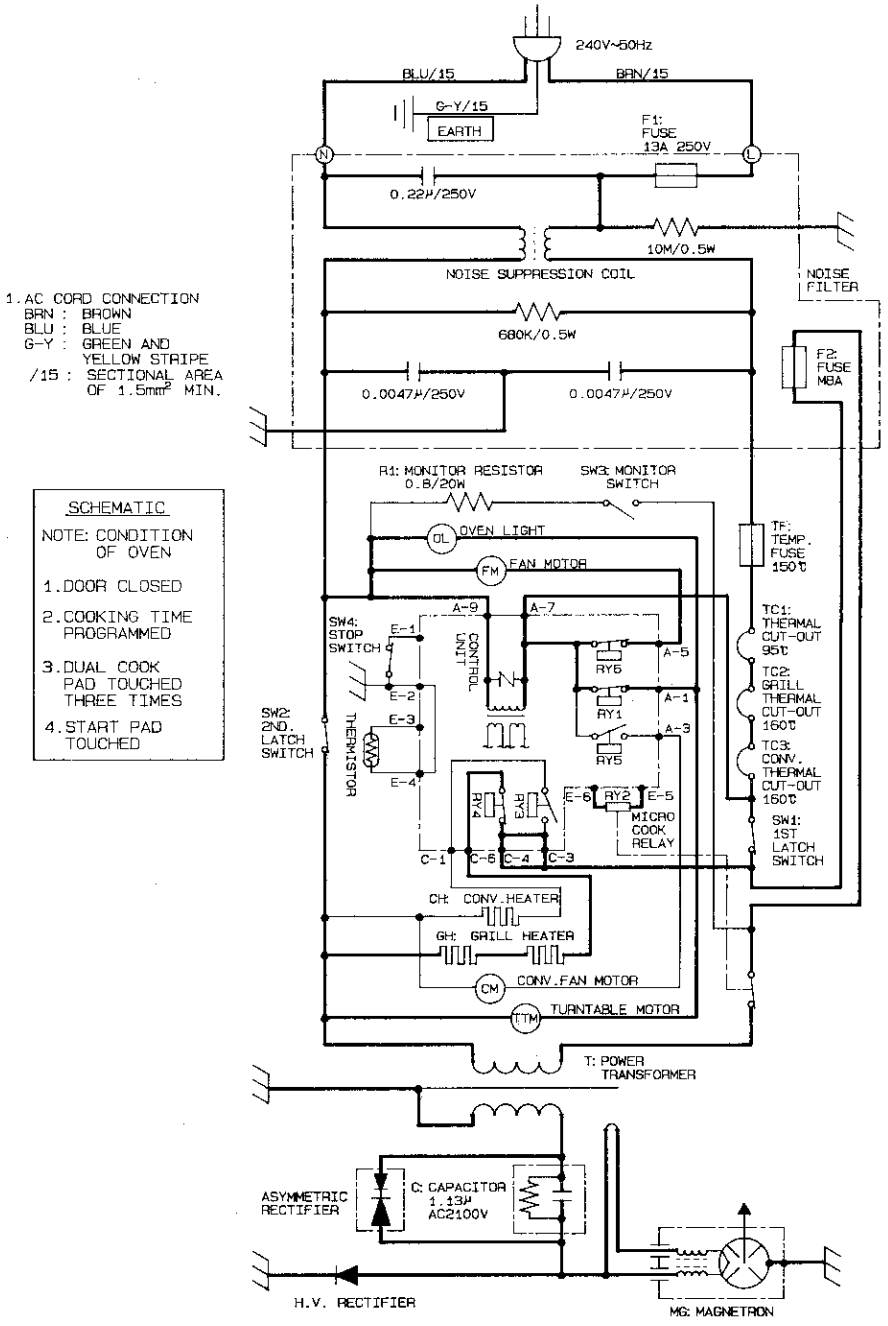


Figure 0-6. Oven Schematic-Dual Cook (Grill) Condition

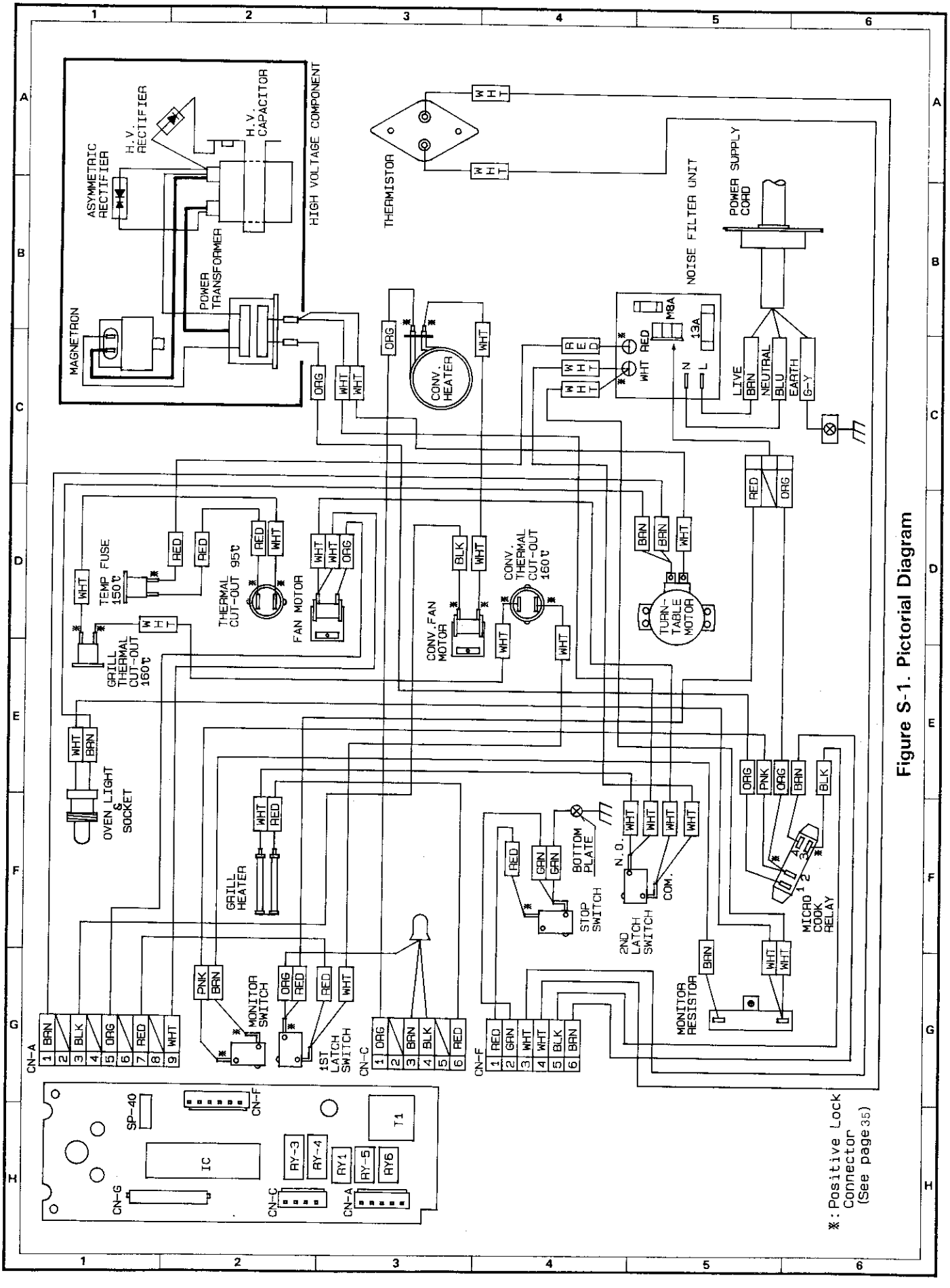


Figure S-1. Pictorial Diagram

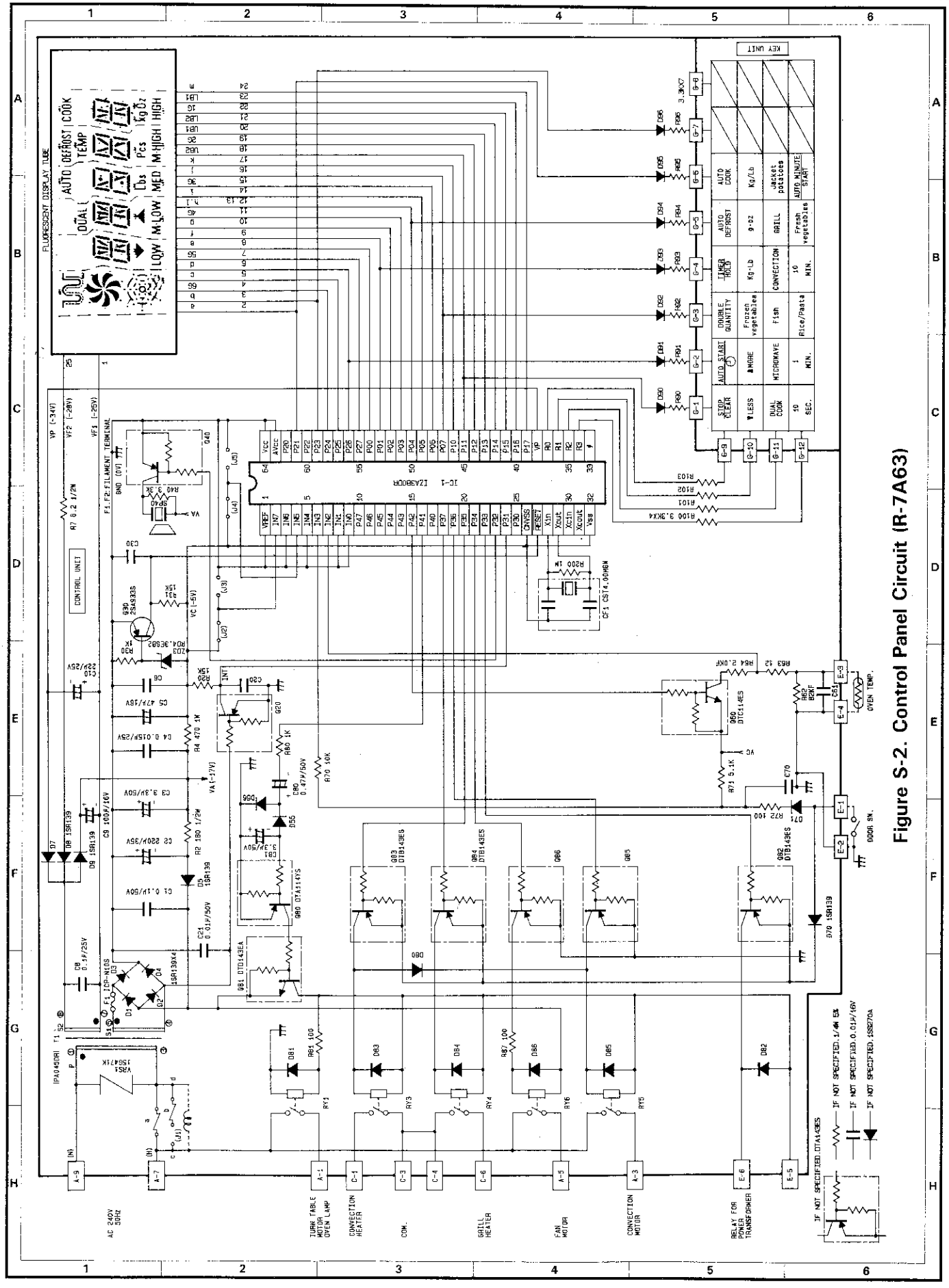


Figure S-2. Control Panel Circuit (R-7A63)

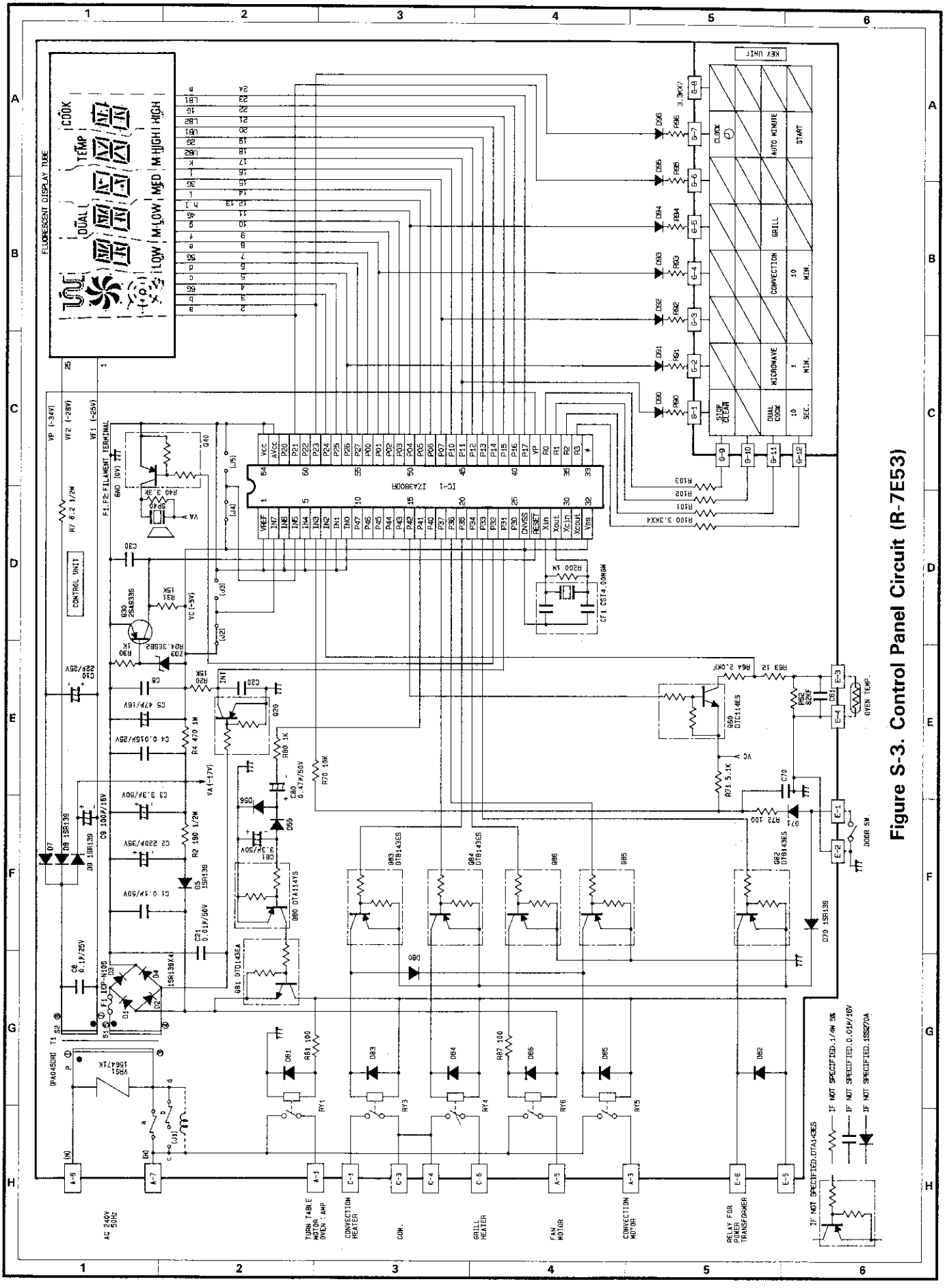


Figure S-3. Control Panel Circuit (R-7E53)

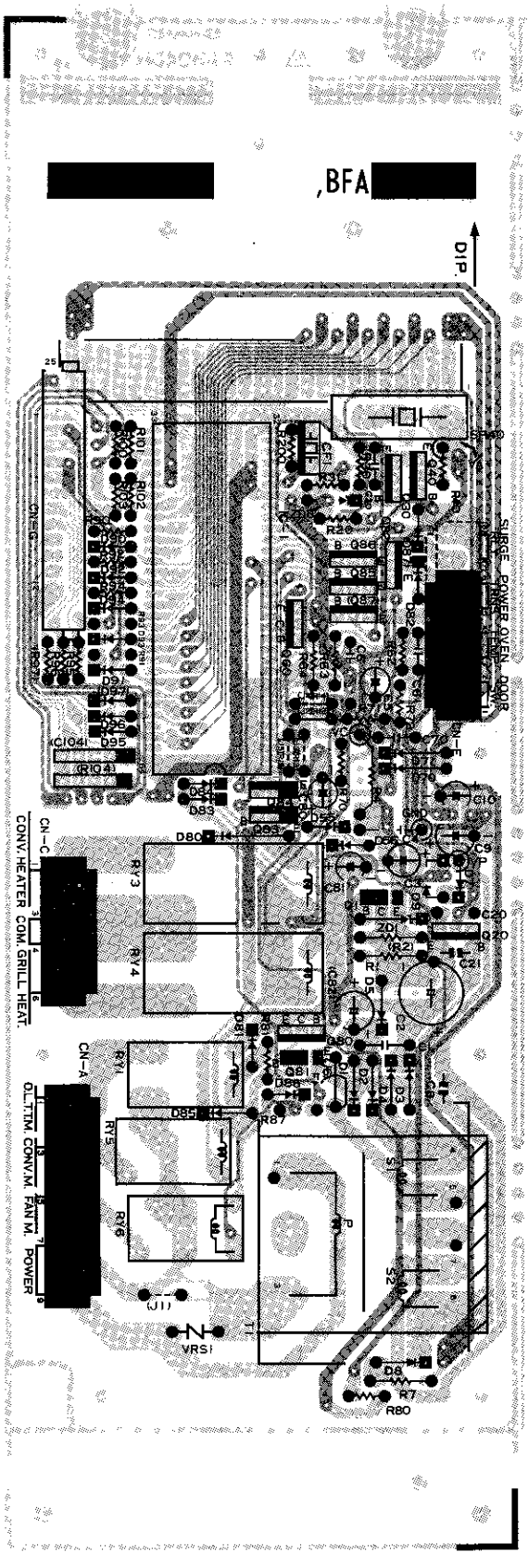


Figure S-4. Printed Wiring Board

PARTS LIST

Note : The parts marked "*" are used in voltage more than 250V.
"§"MARK: SPARE PARTS-DELIVERY SECTION

	REF. NO.	PART NO.	§	DESCRIPTION	Q'TY	CODE
				ELECTRICAL PARTS		
	1- 1	FACCBA002WRK0	U	Power supply cord	1	NN
*	1- 2	FH-DZA005WRE0	J	H.V. rectifier assembly	1	AQ
	1- 3	FPWBFA242WRE0	U	Noise filter	1	NW
*	1- 4	RC-QZA097WRE0	J	High voltage capacitor	1	AT
	1- 5	FHET-A031WRK0	U	Grill heater ~ RHET-A119 w120	1	OA
	1- 6	FH-HZA007WRE0	J	Thermistor	1	AH
	1- 7	RHET-A120WRE0	U	Convection heater	1	NX
	1- 8	RMOTEA104WRE0	J	Convection fan motor	1	AW
	1- 9	QSW-MA085WRE0	J	1st latch switch	1	AF
	1-10	QSW-MA085WRE0	J	2nd latch switch	1	AF
	1-11	QSW-MA085WRE0	J	Stop switch	1	AF
	1-12	RMOTEA256WRE0	U	Fan motor	1	NW
	1-13	QFS-CA009WRE0	J	Fuse 13A	1	AE
	1-14	QFS-CA010WRE0	J	Fuse M8A	1	AE
	1-15	QFS-TA013WRE0	J	Temp. fuse 150°C	1	AG
	1-16	QSOCLA011WRE0	J	Oven lamp socket	1	AH
	1-17	RLMPTA058WRE0	U	Oven lamp	1	NG
	1-18	RMOTDA165WRE0	U	Turntable motor	1	NQ
	1-19	RR-WZA003WRE0	J	Monitor resistor 0.8Ω 20W	1	AG
	1-20	RRLY-A034WRE0	J	Micro. cook relay	1	AM
*	1-21	RTRN-A335WRE0	U	Power transformer	1	OM
*	1-22	RV-MZA165WRE0	U	Magnetron	1	OF
	1-23	QSW-MA086WRE0	J	Monitor switch	1	AF
	1-24	RTHM-A072WRE0	U	Thermal cut-out 95°C	1	NL
	1-25	RTHM-A071WRE0	U	Grill thermal cut-out 160°C	1	NM
	1-26	RTHM-A071WRE0	U	Conv. thermal cut-out 160°C	1	NM
				CABINET PARTS		
	2- 1	FFTASA053WRK0	U	Oven lamp access cover, complete for (W) model	1	NT
	2- 1	FFTASA052WRK0	U	Oven lamp access cover, complete for (B) model	1	NT
	2- 1-1	PCUSGA165WRP0	U	Oven lamp access cover cushion	1	NC
	2- 2	GCABUA315WRP0	U	Outer case cabinet for (W) model	1	NY
	2- 2	GCABUA351WRP0	U	Outer case cabinet for (B) model	1	NY
	2- 3	FHNG-A169WRY0	U	Lower oven hinge	1	ND
	2- 4	GCABDA059WRP0	U	Rear cabinet	1	NT
	2- 5	GCOVHA271WRP0	U	Turntable motor cover	1	NE
	2- 6	GDAI-A187WRP0	U	Bottom plate	1	NS
	2- 7	GLEGPA028WRE0	U	Foot	4	NA
	2- 8	PCAPHA010WRE0	U	Cabinet cap for (W) model	2	NA
	2- 8	PCAPHA019WRE0	U	Cabinet cap for (B) model	2	NA
				CONTROL PANEL PARTS		
	3- 1	CPWBFA462WRK0	J	Control unit	1	BT
	3- 1A	QCNCMA227DRE0	J	5-pin connector (A)	1	AN
	3- 1B	QCNCMA255DRE0	J	4-pin connector (C)	1	AC
	3- 1C	QCNCMA297DRE0	J	6-pin connector (E)	1	AC
	3- 1D	QCNCWA030DRE0	J	12-pin connector (G)	1	AE
	3- 1E	RV-KXA022DRE0	J	Fluorescent display tube	1	AX
	C1	RC-KZA087DRE0	J	Capacitor 0.1μF 50V	1	AB
	C2	RC-EZA310DRE0	J	Capacitor 220μF 35V	1	AC
	C3,81	RC-EZA226DRE0	J	Capacitor 3.3μF 50V	2	AA
	C4	VCKYB11EX153N	J	Capacitor 0.015μF 25V	1	AA
	C5	RC-EZA229DRE0	J	Capacitor 47μF 16V	1	AB
	C6,20,30 C61,70	VCKYD11CY103N	J	Capacitor 0.01μF 16V	5	AA
	C8	RC-KZA031DRE0	J	Capacitor 0.1μF 25V	1	AA
	C9	RC-EZA230DRE0	J	Capacitor 100μF 16V	1	AB